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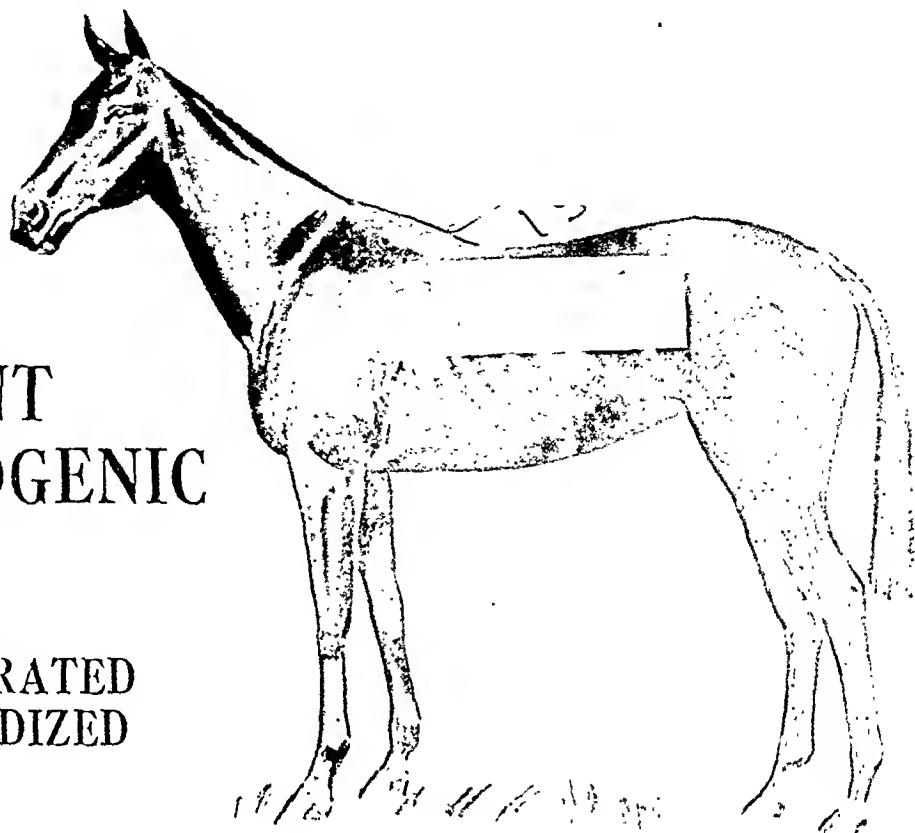
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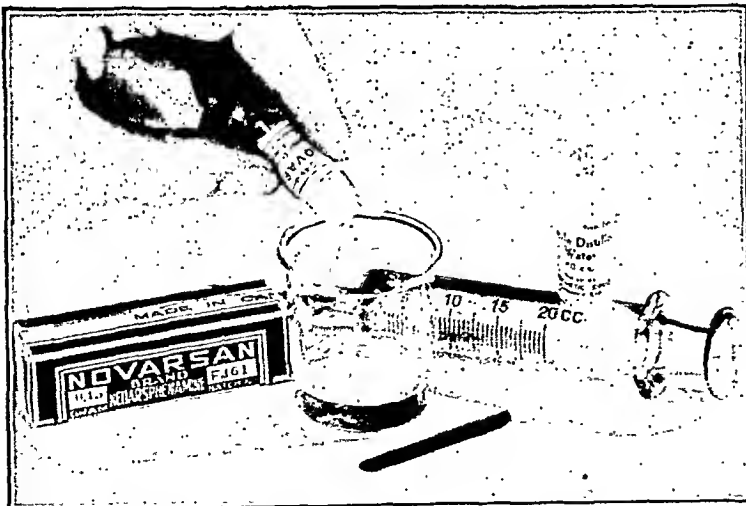
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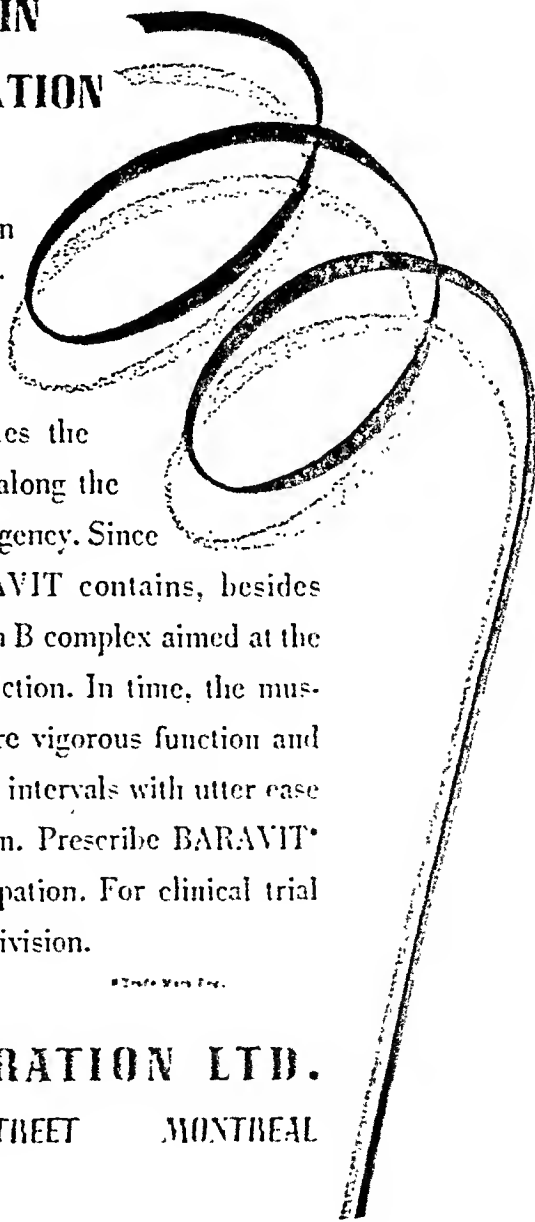
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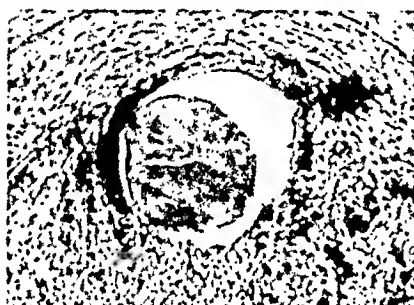
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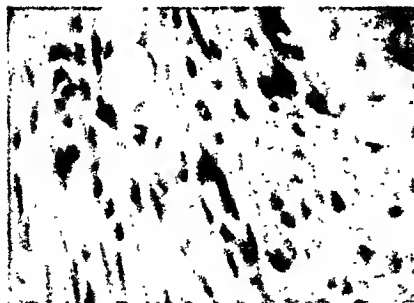
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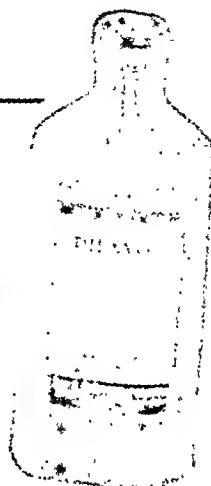
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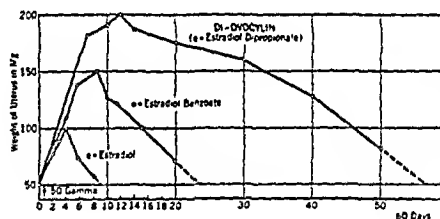
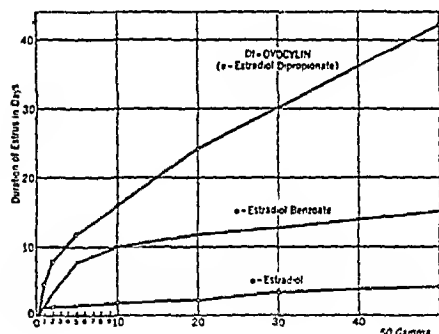
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(Clinical references: *Am. J. Obst. & Gyn.*, Sept. 1939, *Endocrin.*, Vol. 24, No. 4, April, 1939 and Vol. 27, No. 1, July, 1940, etc.)

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More recently it has been shown to play an important rôle in the treatment of certain microcytic anemias. It is particularly indicated in the treatment of those due to hæmorrhage, either acute or chronic. In this condition it is the only form of an active liver preparation available. *British Medical Journal*, 1940, 2, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

*Study of the value of B. D. H. Anahæmin in the treatment of pernicious anemia, the hæmorrhagic and aplastic anemias, and the microcytic anemias.*

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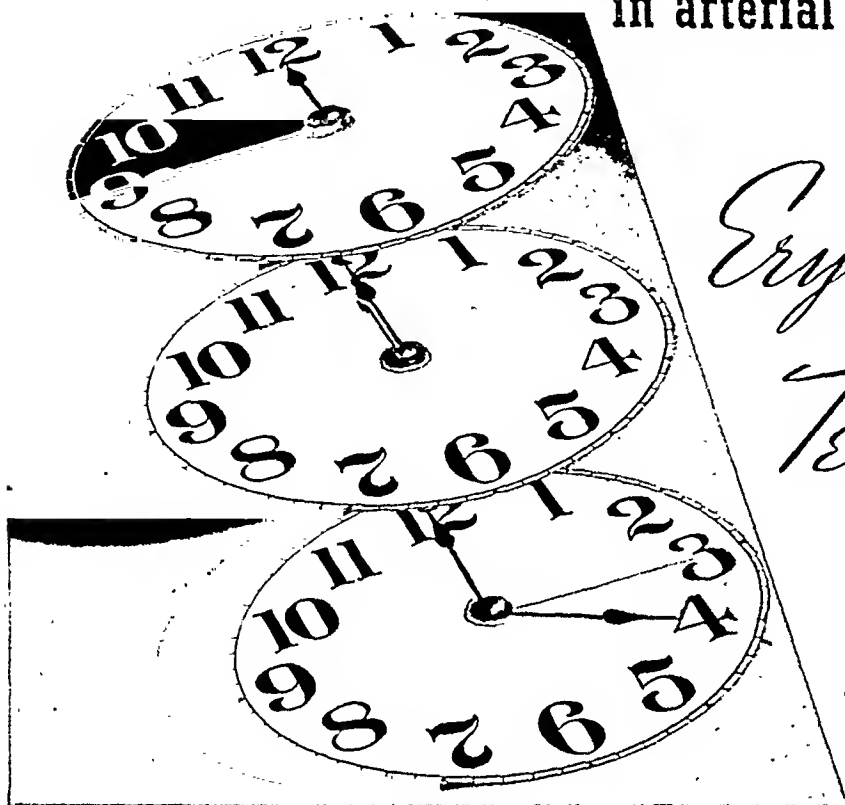
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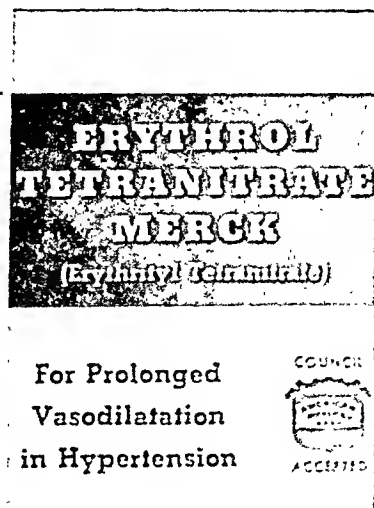
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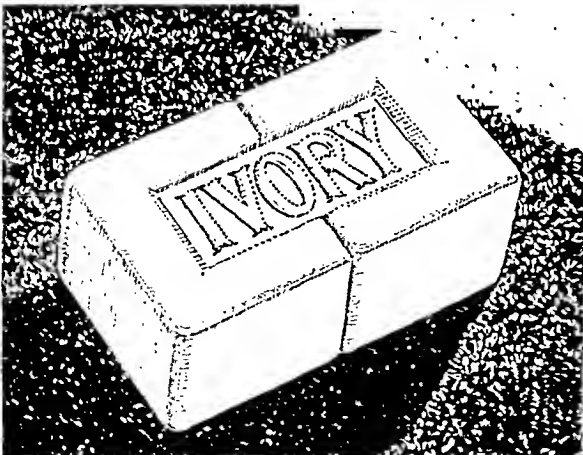
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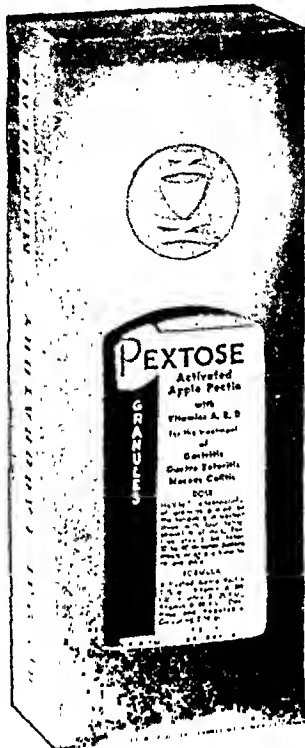
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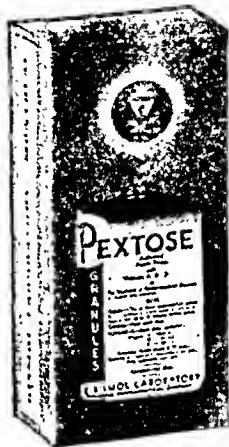
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Am. J. Dig. Dis. 6:12, 1939.

Am. J. Dig. Dis. and Nut. 3:570, 1936.

Klin. Wochn. 14:1536, 1935.

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OTHER FACTORS OF B COMPLEX  
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NICOTINAMIDE—approximately 6 milligrams.

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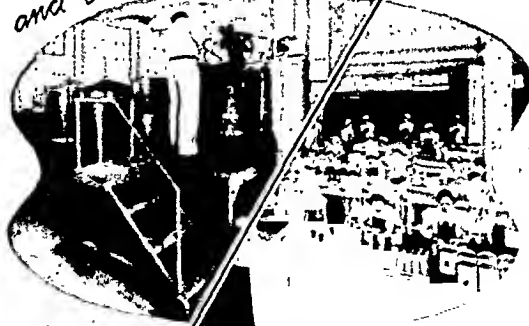
VITAMIN B<sub>2</sub>: approximately 500 micrograms.

NICOTINAMIDE: approximately 12 milligrams.

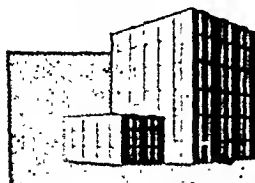
OTHER FACTORS OF THE B COMPLEX found in liver—in the amounts represented by approximately 40 Gm. (1½ ounces) of fresh liver.

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*Editor*

A. G. NICHOLLS, M.A., M.D., D.Sc., F.R.S.C., F.R.C.P.(C)

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THE CANADIAN MEDICAL ASSOCIATION

1941

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## ISINGLASS AS A TRANSFUSION FLUID IN HÆMORRHAGE

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ON general physiological grounds whole blood is, of course, the ideal transfusion fluid, and plasma or serum has proved a very satisfactory substitute. These fluids, nevertheless, possess certain disadvantages from a practical point of view. Chief among these are incompatibility and storage difficulties of whole blood and the difficulty of having adequate supplies on hand of either blood, plasma or serum, to meet the requirements of a large number of casualties. When one considers that a severe case of hæmorrhage or of shock may require the transfusion of 2 litres of fluid and that each donor furnishes 400 c.c. of blood (or about 200 c.c. of serum) the need for a blood substitute becomes apparent. It has been amply proved that the prime requirement in hæmorrhage is to fill the vessels and so maintain the blood pressure. Compared with the reduction in the volume of the blood the loss of red cells is of very secondary importance as an immediate threat to life. Further, so far as we know at present, it is certain physical properties of the transfusion fluid rather than any biochemical characteristics it may possess which are essential for its success in the treatment of hæmorrhage or shock.

In order to restore and maintain the volume of circulating fluid a transfusion fluid must answer the following requirements. (a) The molecule of the dissolved substance must be of such a size that the fluid will not leave the vessels too freely. (b) The solution must exert an osmotic pressure and possess a viscosity approaching as closely as possible that of whole blood; these qualifications depend upon molecular size and shape. (c) It should be as nearly as possible isotonic with the contents of the

erythrocytes. (d) It must, of course, be non-antigenic and innocuous in every respect. In addition, it should be readily available, preferably cheap, and capable of being quickly and easily prepared for intravenous administration. Provided it is suitable in the respects just listed there appears to be no valid objection to the use of some fluid other than blood or serum to fill the vessels after hæmorrhage.

A 7 per cent solution of ordinary gelatin in 0.9 per cent saline solution meets all but the last (d) of the foregoing specifications. Recalling the common sources of animal gelatin (bones, tendons, skins, etc.) it is no surprise that many instances should have been cited in the literature<sup>1, 2, 3</sup> in which it has been responsible for infection with the germs of tetanus. There is also a real fear of anthrax infection. It occurred to us that the danger of tetanus or anthrax infection could be avoided by the use of fish gelatin. Fish gelatin or isinglass is prepared from the sounds or swimming bladders of various species (sturgeon, hake, sea trout, etc.) and is used commercially in large quantities, chiefly by the brewing industry in the fining or clarifying process. The sounds as obtained from brewery supply houses appear as compressed thin translucent sheets or large shreds. They dissolve readily in warm water, but globules of an oily material collect on the surface of the solution and are mainly responsible for the latter's very disagreeable fishy smell. The crude commercial material is relatively cheap.

This material, even after removing the fatty impurities and freeing it from anything but a slightly fishy odour, was mildly toxic. When transfused into dogs after bleeding an initial

rise followed by a fall in blood pressure occurred. The method described below has proved successful in freeing the material from toxicity.

Two artificial solutions—saline and gum acacia—have been used in the past to restore the blood volume reduced as a result of hæmorrhage or shock. Saline, though effective in states of dehydration, is almost useless as a transfusion fluid when whole blood or plasma has been lost. Its failure is due to two causes. In the first place it is unable, except in excessive amounts, to raise the blood pressure to the pre-hæmorrhage level because its viscosity is no greater, practically, than that of water. Secondly, it diffuses freely from the vessels; any rise in pressure which does follow the transfusion of saline is therefore very evanescent. During the last war Bayliss<sup>4</sup> advocated gum acacia as a blood substitute. It was used as a 6 per cent solution in physiological saline. The osmotic pressure and viscosity of this solution are closely similar to those of blood and the fluid is retained in the circulation for a considerable time; it enjoyed a high degree of success in the treatment of shock and hæmorrhage. Keith,<sup>5</sup> who had a wide experience of its use in France, considered this fluid to be as valuable as whole blood itself in the treatment of these conditions. Nevertheless, gum acacia has come into disfavour within recent years, for it is believed to cause chronic liver damage. Ynile and Knutti,<sup>6</sup> for example, have reported enlargement of the livers of dogs to from 5 to 6 times the normal weight after weekly injections of a 6 per cent solution of gum acacia. The livers contained from 8 to 10 per cent of acacia. Further, the plasma proteins, especially fibrinogen, were profoundly depressed and remained below normal for several months after the acacia injections had been discontinued. Such effects are not surprising for, unlike gelatin (or rather the mother substance of gelatin, collagen) acacia is foreign to the animal body. It is a carbohydrate (pentosan) which apparently the body is unable to metabolize. The fate of isinglass after its introduction into the blood stream is now being investigated; it is probably broken down and used by the tissues.

#### METHOD OF PREPARATION OF ISINGLASS

A very simple method has been used in the preparation of the isinglass solutions for intravenous administration. Briefly it is as follows. The dried fish sounds are dissolved in about 5 times their weight of water, kept at about 60° C. The solution is then acidified with hydrochloric acid to approximately pH 4.0. Cellite (Johns Manville) is added to facilitate

filtration, which is carried out with suction through linen. Occasionally it has been found necessary to refilter through a fluted filter paper to remove small amounts of particulate material. Sodium chloride is added to the clear solution which is then poured into cold ethyl alcohol. The precipitate is collected on a Buehner funnel, washed with 95 per cent alcohol, and finally dried *in vacuo* over calcium chloride. This dried material dissolves in warm water readily and completely. It has been used as a 7 per cent solution in isotonic saline. For every 7 g. 10 c.c. of a solution containing 2.5 per cent NaHCO<sub>3</sub> and 7.5 per cent NaCl has been used and the total volume made up to 100 c.c. with distilled water. In this way the solution is isotonic with respect to NaCl and has a pH of about 7.2.

In our experiments these solutions have been made up immediately before they were required. Solutions prepared as just described from different isinglass preparations have been tested by our colleague Dr. R. Hare and have been found to be sterile after boiling for five minutes. Further work is in progress to determine the efficacy of this simple sterilization procedure which might be employed in certain emergencies. It has been found by Mr. Knowles, of the Connaught Laboratories, that the above solutions may be filtered with tolerable speed through a sterilizing Seitz pad if the solution be kept warm.

#### MOLECULAR WEIGHT OF GELATIN, OSMOTIC PRESSURE AND VISCOSITY DETERMINATIONS

The molecular weight of mammalian gelatin, as determined by different workers varies from 10,000 to 96,000.<sup>7, 8, 9, 10, 11</sup> This great variability in molecular weight of animal gelatins from different sources which, of course, will be reflected in their physical properties, has been an additional drawback to the use of this material as a transfusion fluid. Smith obtained a value of around 11 mm. Hg. for the osmotic pressure of a 0.5 solution of an ash-free sample of commercial gelatin. We have carried out osmotic pressure observations on a 7 per cent solution of isinglass prepared as described above. The osmometer used consisted of a small sausage-shaped cellophane bag fastened to the lower end of a long vertical glass tube (2 mm. bore). The solution was run into the bag until it rose in the tubing to a height somewhat below that expected to result from the fully developed osmotic pressure. The bag was then suspended in a 0.9 saline solution. The osmotic solution determined in this manner amounted to about 38 mm. Hg. This is, of course, considerably higher than that of blood plasma. The osmotic pressure of plasma separated by a semi-permeable membrane from a solution isotonic with its non-protein constituents is from 25 to



30 mm. Hg. The plasma owes its osmotic pressure mainly to serum albumin, to a less extent to the globulin fraction, and to a very minor degree to fibrinogen. We have not determined the osmotic pressure of serum (*i.e.*, plasma less fibrinogen) but this should be only slightly less than the value generally accepted for plasma. The relatively high osmotic pressure of a 7 per cent solution of isinglass is, however, we believe, an advantage rather than otherwise. One may reasonably assume that such a solution would act in a manner similar to that of concentrated plasma or serum, namely, to hasten the withdrawal of fluid from the extravascular spaces into the blood stream.

We do not know the size or shape of the molecule of our isinglass preparation. Unless it is of such a size and shape as to be retained within the capillary membrane *in vitro* determinations of osmotic pressure can be taken only as an approximate gauge of its effective osmotic pressure within the vascular system.

The viscosity of blood is a factor of the first importance in maintaining the arterial blood pressure. The chief constituents responsible for blood's viscosity are the cells and the plasma proteins, the latter contributing to only a minor

degree. We have found that whole blood (both human and canine) has a viscosity over three and a half times that of serum or plasma. A number of determinations have been carried out upon the blood, plasma and serum of dogs, upon human whole blood and serum, and upon a 7 per cent solution of isinglass. The viscosity of the last is some three times that of water, about double that of human serum or plasma, though only a little better than half of that of human whole blood. From the point of view of viscosity an isinglass solution is therefore superior to plasma or serum as a transfusion fluid but much inferior, of course, to whole blood. A 7 per cent solution of our preparation of isinglass does not gel at room temperature.

#### METHODS AND RESULTS

Dogs were used in all our transfusion experiments. The animals were anaesthetized with nembutal and ether in the earlier acute experiments, and with ether alone in the survival experiments and controls. They were bled from the femoral artery of one side specially exposed for the purpose, or, as in the later experiments, from the same cannula in the femoral from which the blood pressure was recorded. When

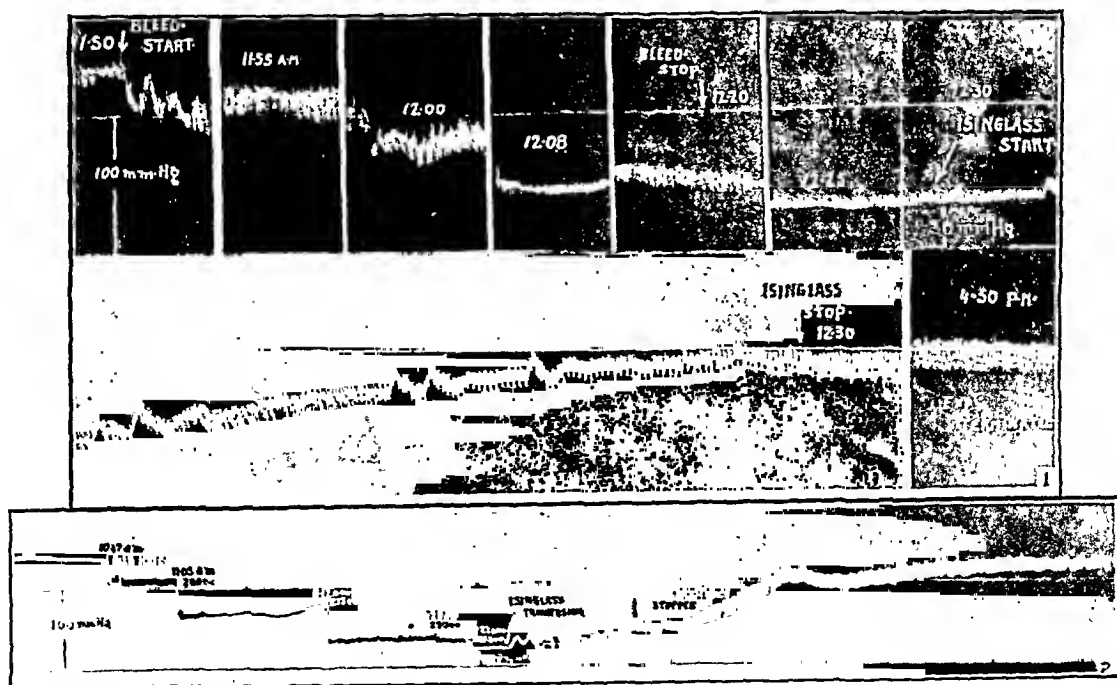


Fig. 1.—Showing the fall in blood pressure due to hemorrhage, and its restoration and maintenance for several hours by the transfusion of a 7 per cent solution of isinglass. The sharp peaks in the tracings are caused by the too rapid injection of the solution. Fig. 2.—Showing the effect of the transfusion of a solution of isinglass on the blood pressure of a dog which had been bled to the extent of 47 per cent of its blood volume within 30 minutes. This animal recovered completely.



As already mentioned, the animals varied widely in this respect. The rate of bleeding is a very important factor and in order to weight the scales in favour of the animals not treated with isinglass the period of bleeding in most of the control experiments was made considerably longer (35 to 60 minutes). We have been unable to predict even approximately what proportion of the calculated blood volume it is necessary to withdraw to cause death. In one animal it was necessary to cause the loss of 59 per cent of its blood volume to cause death, whereas in one other a 29 per cent loss was fatal. As already mentioned, it is much easier to predict the extent of the blood pressure fall which

ture, *e.g.*, the vasomotor centre, has as a result probably of powerful vasoconstriction, been deprived of an adequate blood supply and thereby suffered irreparable damage. It may be recalled that a large proportion of the blood volume normally is contained in the heart and larger vessels—about 75 per cent according to the experiments of Mann.<sup>14</sup> It is therefore evident that in order to maintain a pressure even of 30 mm. Hg. a large proportion of the reduced blood volume must still be held in the heart and larger vessels, for the capacity of this part of the vascular tree cannot undergo any great reduction. This means that the minute vessels upon which the blood supply of the tissues

TABLE III.  
CONTROL EXPERIMENTS

Dog	Date	Body weight kg.	Calculated blood volume c.c.	Quantity of blood lost c.c.	Percentage blood volume	Duration of bleeding (min.)	Mean blood pressure mm. Hg.		Hæmatocrit		Time of death from end of bleeding period
							Before bleeding	End of bleeding	Before bleeding	End of bleeding	
23	6/3/41	22.25	1,760	510	29	25	180	24	..	..	6 minutes.
24	10/3/41	22.50	1,800	800	44	35	150	22	..	..	20 minutes.
25	12/3/41	10.20	816	440	54	42	140	30	66	53	13 minutes.
26	13/3/41	14.25	1,140	625	55	55	140	24	60	48	15 minutes.
27	14/3/41	8.25	660	370	57	60	130	23	38	33	90 minutes.
28	17/3/41	11.70	936	430	46	33	130	46	59	47	17½ hours.
29	17/3/41	9.7	776	330	43	18	82	28	51	..	Less than 1 min.
30	18/3/41	9.2	736	310	43	38	160	34	53	46	Complete recovery
31	20/3/41	17.0	1,360	520	38	32	132	32	47	42	5 minutes.
32	20/3/41	16.2	1,296	727	56	60	120	42	52	44	Complete recovery
33	21/3/41	11.2	896	455	51	43	144	34	62	50	Complete recovery
34	21/3/41	14.7	1,176	695	59	35	130	40	48	53	12 minutes.
35	28/3/41	15.5	1,240	650	52	30	175	41	..	..	30 minutes.

will prove fatal. A pressure around 30 mm. Hg. is critical. No untreated animal has survived for more than a short period after its blood pressure immediately after hæmorrhage had fallen below 34 mm. Hg.

The reason that a greater blood loss is required to depress the blood pressure below the critical level when the bleeding is slow than when it is rapid is indicated by the hæmatocrit findings. With the slower hæmorrhage, time is allowed for a partial restoration of the blood volume by fluid entering the vessels from the extravascular spaces. The later bleedings of a long bleeding period withdraw diluted blood and in consequence a smaller proportion of red cells. It is interesting to examine the blood pressure record from the point where the critical level is reached to the death of the animal. The tracing remains flat for several minutes but then commences to decline rather rapidly, which suggests that the heart or some vital nervous struc-

depends must be very powerfully constricted. Therefore, if the hæmorrhage amounts to 50 per cent or so of the blood volume vital tissues may be almost completely deprived of oxygen. With a blood pressure of around 25 mm. Hg. in the femoral artery that in the capillaries must be near the vanishing point and certainly far below the osmotic pressure of the plasma; it follows, therefore, that the passage of fluid from the blood to the tissues is in abeyance.

#### ATTEMPTS TO SENSITIZE ANIMALS TO ISINGLASS

There is general agreement that gelatin is non-antigenic. However, we have considered it worth while to carry out some experiments to be sure that our preparations of isinglass are non-antigenic. It is possible that while gelatin injected in the usual form is free from antigenicity, the use of a gelatin precipitate obtained by means of alum might make possible the successful sensitization of guinea pigs (Caul-

feild *et al.*<sup>15</sup>). We have used this more rigid test of antigenicity. A 10 per cent solution of isinglass was partially precipitated with iron alum and injected subcutaneously into guinea pigs, using either 5 or 2 c.c. The "shock" dose of isinglass was injected either intravenously or intracardially 5½ weeks later. In some preliminary experiments on 12 guinea pigs no evidence of sensitization by this procedure has been observed. Also dogs which had been bled and the blood volume restored with relatively large injections of isinglass have later been anesthetized with ether and reinjected with an isinglass solution. Of the animals thus treated two showed mild but typical anaphylactic reactions. These animals were tested 12 days after the first injection of isinglass. Those tested after a longer interval (3 to 4 weeks) have shown no evidence of sensitization. It appears therefore that our isinglass preparations, at present, are capable of conferring upon dogs injected with relatively massive doses a mild degree of sensitization which is detectable so far within the first two weeks only of the first injection. This sensitization is to be attributed probably to fish protein contaminating our isinglass preparations, rather than to the isinglass itself. The very mild procedures adopted in the preparation of the isinglass from the dried fish sounds were calculated to preserve the molecular complexity of the isinglass. It is probable that more vigorous treatment is necessary to rid the product of all contaminating protein. Methods are now being tried whereby both objects will as far as possible be achieved—the isolation of an isinglass which has suffered little molecular degradation and which is freed of all contaminating fish protein.

#### DISCUSSION

A comparison of the data in Tables II and III will show that though the rate of bleeding in the transfused animals was on the whole considerably more rapid than in the controls, the former survived after the loss of a somewhat greater proportion of their calculated blood volume. The greatest blood loss that an animal was able to overcome unaided was 56 per cent of its calculated blood volume; the smallest hemorrhage which proved fatal in this group was 29 per cent of the blood volume. Three other control animals succumbed to a loss amounting to less than 45 per cent of their total blood and only one survived after a loss of over

55 per cent. In this experiment (dog no. 32) the bleeding period was much longer (60 minutes) than in any of the survival experiments. It will also be observed that the blood pressure (42 mm. Hg.) of this animal was not depressed to the critical level. In the series of transfused animals, on the other hand, none succumbed after a blood loss amounting to less than 45 per cent of the blood volume, and four survived after a loss of over 55 per cent. Of these, two recovered completely after a loss of 58 and 57 per cent, respectively. Even those animals of the transfused group which succumbed made an excellent immediate recovery and did not die until several hours later. One of the four fatalities (dog no. 14) in this group undoubtedly received an insufficient volume of the transfusion fluid and the others could probably have been saved by careful nursing. In the control series, on the contrary, death occurred in most instances within a few minutes after the termination of the bleeding.

It has been mentioned that we have found in dogs a rather wide variation in the magnitude of the blood loss which is fatal. Other observers have remarked upon this fact. On this account the foregoing figures alone would not, perhaps, permit one to conclude positively as to the efficacy of isinglass as a substitute for lost blood. The blood pressure records provide a surer indication of its value. No animal of the control series whose blood pressure had fallen below 34 mm. Hg. survived, whereas several of those which had been transfused with isinglass solution and recovered, recorded a blood pressure of less than 24 mm. Hg. at the end of the period of bleeding and in five animals the pressure had fallen below 20 mm. Hg. In none of the fatalities of this series was the blood pressure before transfusion higher than 20 mm. Hg.

Dog No. 8 deserves special mention. This animal suffered mild anaphylactic shock after the injection of horse serum to which it had been sensitized some two weeks previously. When the shock had passed off, as indicated by the return of the blood pressure to near the pre-shock level, it was bled to 50 per cent of its blood volume. The blood pressure fell again, reaching a very low level, and breathing ceased. The animal was revived by artificial respiration and the injection of adrenaline, and was then immediately transfused with 350 c.c. of isinglass solution. It recovered and regained its strength

to a surprising degree. It survived for 21 hours. Had this animal not been transfused it is extremely unlikely that it would have even survived the anaesthetic.

In nearly all the experiments tabulated in Table II the isinglass solution was given in a single injection, but certain of our observations suggest that it would be of even greater benefit, and that some of those animals which died would have survived, had the total amount been given in two or three instalments at intervals of four or five hours. All that one need aim at in the transfusion operation is to tide the subject over the critical period and until his own restorative mechanisms have become effective. It is quite conceivable that if means exist for metabolizing isinglass, and if these means are competent to cause the disappearance of large quantities from the circulation, then smaller transfusions at intervals should extend the beneficial effect of the transfusion over a longer period.

#### SUMMARY

1. The properties of a 7 per cent solution of fish gelatin or isinglass in 0.9 per cent saline are described. This solution has been found to fulfil the rather rigid specifications of a transfusion fluid which have been listed in this paper.

2. As prepared from the sounds of fish by the method described, isinglass is soluble in water or saline, is without toxicity, and can be readily sterilized by raising its temperature to 100° C. for 5 minutes. It forms a perfectly clear pale yellow solution.

3. Experiments are reported in which a 7 per cent solution of isinglass in saline is capable of restoring the blood pressure after it had been lowered by hæmorrhage and of saving the lives of animals which, had no treatment been instituted, undoubtedly would have died. These animals made a complete and uneventful recovery.

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#### RÉSUMÉ

Dans l'hémorrhagie ou le shock l'essentiel est de redonner à la masse sanguine un volume suffisant. Pour atteindre ce but le liquide transfusé doit être une substance dissoute dont les molécules se maintiennent à l'intérieur des vaisseaux et dont la tension osmotique et la viscosité se rapprochent de celles du sang; ce liquide doit être isotonique avec le contenu des globules rouges; il ne doit pas être antigénique; il doit être inoffensif. La solution de gélatine doit être rejetée parce qu'elle peut véhiculer le tétanos ou le charbon. La gélatine de poisson ne fait pas courir ces risques. On la prépare avec les osies et les vésicules muqueuses de diverses espèces dont l'esturgeon et la truite de mer. Elle peut être stérilisée par l'ébullition pendant 5 minutes. Le sérum physiologique est trop vite absorbé pour rendre de véritables services. La solution de gomme acacia provoque des dégâts hépatiques. La solution de gélatine de poisson à 7 pour cent dans du sérum physiologique salé à 0.9 pour cent a une tension osmotique un peu supérieure à celle du plasma sanguin; on ne connaît pas les dimensions et la forme de sa molécule; sa viscosité est supérieure à celle du plasma mais inférieure à celle du sang total. L'expérience chez le chien démontre que la transfusion de gélatine de poisson relève la tension artérielle abaissée par l'hémorrhagie et évite l'issue fatale certaine qu'eût entraînée l'abstention thérapeutique. La guérison des chiens ainsi traités s'est effectuée dans les délais normaux.

JEAN SAUCIER



## UTERO-SALPINGOGRAPHY\*

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BY utero-salpingography is meant the x-ray shadow of the uterine and tubal cavities reproduced by injection into them of an opaque fluid. In 1914 two French doctors, Dartigues and Dimier,<sup>1</sup> worked out this method, but due to the War their results were published only in 1916. In the meantime H. Cary<sup>2</sup> published a "Note on determination of patency of Fallopian tubes by use of collargol and x-ray shadows", and claimed the honour of being the first to use this method.

In 1915, I. C. Rubin<sup>3</sup> published "X-ray diagnosis in gynecology with the aid of intra-uterine collargol injection". The success was not up to what was expected. No practical results were obtained, either on account of the lack of opacity or on account of the accidents which occurred. It was only in 1924, that Sieard and Forestier<sup>4</sup> after some successes with intra-spinal and intra-bronchial injections of iodized oil, which contains 40 per cent of its weight in iodine, used it for injection into the uterine cavity and the tubes.

Heuser<sup>5</sup> and Carelli in Buenos-Ayres published independently, beautiful pictures of the injected uterus and tubes. The method thereafter spread universally. In France, Moequot<sup>6</sup> and his pupil, Oumansky,<sup>7</sup> Claude Bécélère,<sup>8</sup> Cotte, devoted many hours to the study and improvement of this method. In England, Fordsdike,<sup>9</sup> in the United States, Rubin and Benedick,<sup>10</sup> Rendall; in Germany, Dyroft; in Russia, Arnstan and Reinberg; in Poland, Zadwodzinski, Spira, and many others published the results of their experiences, bringing to a degree of perfection the technique and precision in the interpretation of films.

Here in Canada, Magnan, my associate professor of gynecology at the University of Montreal, to whom I am indebted for a good part of this bibliography, in his monograph published in 1929 presented a thesis for his doctorate of l'Université de Paris on "Anomalies and mal-

formation of the genital tract in the female" as depicted by utero-salpingography.

The uterus and the tubes being cavities, no direct x-ray examination could reveal their shadows. An opaque liquid is therefore used, and since the advent of lipiodol or "iodized oil" as used by Sieard and Forestier we have always adhered to this agent. It is a perfectly sterile product, the quantity of iodine in lipiodol adds to its asepsis, an antiseptic factor which is not to be denied. In working in septic cavities such as the vagina, the uterus, and the tubes, one must be careful not to injure the abdominal cavity by an infected liquid dispersed into it.

In order to fill these cavities a series of catheters, tubes, and syringes have been utilized, some working satisfactorily, others presenting lesser advantages. For a number of years we have obtained good results by the use of Bécélère's apparatus, which is compact, easy to sterilize, and not too bulky. It is essentially composed of (Fig. 1) a glass syringe in an open metal guard, a long metal catheter or sound with adjustable rubber stopper of varying sizes according to the variety of the cervix to which it is to be adapted, two cervix forceps with special attachment, and last, but not least, a manometer with a phosphorescent hand to measure and limit the pressure during the injection.

There must be complete co-operation between the radiologist and the gynecologist in order to obtain good results. If it is true that the injection is innocuous, and that it is not necessary to give an anæsthetic or keep the patient in hospital, it is advisable to have the patient rest for a few hours after the examination. For that reason, unless a radiologist arranges for special accommodation for the complete rest of the patient after the injection, it is considered preferable to use the services of a radiologist working in a hospital.

The radiological equipment must be adequate. The Coolidge lamps, with the double reinforcing screens, take an x-ray of the pelvis in half a

\* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Section of Medicine, Toronto, June 20, 1940.

second, and with a Potter Bucky demonstrate either profile or direct shadows.

It is essential to have a table with a lamp over it and a lamp under it. We may wish to take a shot at an opportune moment during the injection. With the under-table lamp, without displacing the patient, we can quickly get an x-ray by putting a plate over the patient's body; with the lamp over the table nice pictures will be obtained with the Potter Bucky under the patient.

Stirrups must be adapted or adaptable to the table to permit the patient to be in the gynæcological or obstetrical position. The injection must be made and the instruments put in position while the patient is on the radiological table. It is also important to develop the films immediately after their exposure, to determine on the necessity of repeating if the first examination is unsatisfactory.

When it has been decided to perform an utero-salpingography it is necessary to prepare the patient. This preparation is about the same as the one we would make for a curettage. For a few days prior to the examination, vaginal douches are given with the ordinary antiseptics. On the eve an enema is given. On arrival at the clinic or hospital the patient is put to rest, if possible lying down for from 20 to 30 minutes. A douche is given. It is not indispensable to shave the vulva, although some authors recommend it, as some also recommend the use of a rectal suppository of morphia or belladonna. As was said before, this examination is not painful but this precautionary measure may be taken in such cases as we fear the patient to be apprehensive.

Now that we have reviewed the necessary instruments, the radiological equipment, and the preparation of the patient, what are the main points to remember in the technique of the injection? Errors in this may lead sometimes to complete failure or serious accidents. (1) Antisepsis must be as perfect as possible; (2) there must be complete obturation of the cervical os; (3) a sufficient quantity of liquid must be injected; (4) constantly measure the pressure with the manometer.

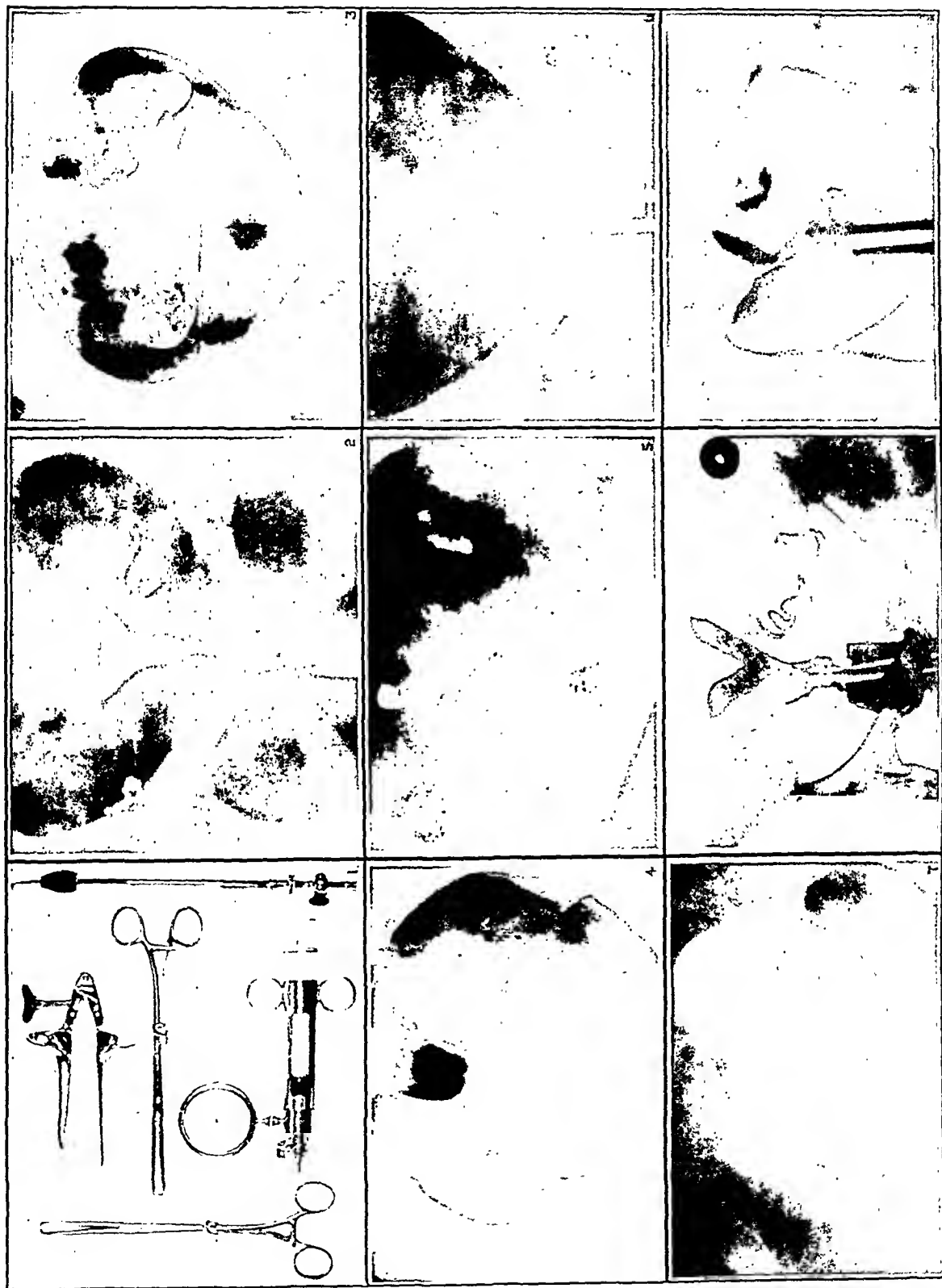
#### TECHNIQUE OF THE INJECTION

*Antisepsis of the vulva, the vagina, and the cervix.*—The vaginal douches have already served a practical purpose during the 72 or 48 hours which have preceded this special examina-

tion, but it is necessary, after the introduction of the vaginal speculum with a complete lateral opening, in order to remove it without displacing the metal catheter or sound, to swab the vagina and the cervix with a sterile piece of cotton or gauze tampon, and then swab it again with iodine or any other antiseptic. We then lower the cervix with Museux's forceps applied on the right commissure, and find the length of the cervix and the uterine cavity by hysterometry.

*Complete obturation of the cervical os.*—The size of the cervical aperture will determine the size of the rubber stopper to be used, and the height at which it must be placed on the sound will be determined by hysterometry. The end of the metal sound must not over-ride the isthmus. The sound is then introduced into the uterine aperture and the stopper is firmly applied to the cervix. The sound is then adapted in the special gadget on the cervical forceps. It is locked and then gradually screwed so that the stopper will push itself, as it were, into the cervix, and the forceps will bring the womb downward, closing tightly the openings by which the fluid could reflow into the vagina. The patient will eventually let you know when she is starting to feel a slight pain. It is then time to stop tightening the screw; complete obturation of the cervical os has been produced.

*Injection of the fluid.*—The syringe, with its manometer, into which has been poured the 20 c.c. of opaque fluid, is then adapted to the metal sound, the lights are put out, and time is taken to get the eyes used to a complete blackout. No attempt is made to inject the uterus until we can easily read the manometer. The fluoroscope is then put into action, and the forceps and the sounds land-marked. By gentle pressure on the piston the fluid is slowly injected into the uterus, and its course may be watched enlarging the cavity and its flow followed into the tubes (if the tubes can be injected), and sometimes drops may even be seen falling from the fringes into the cavity. Hardly any or no pain should be felt by the patient during the injection. At first the shadow is rather light, but as the quantity of fluid becomes sufficient the opacity of the injected liquid should compare favourably with the opacity of the instruments that are in constant view of the eye through the fluoroscopic screen. If the tubes are not injected, or if there are gaps, one must



CASES DIAGNOSTIC BY INJECTION METHOD

Fig. 1.—Hickey's apparatus. Comprising cervical forceps, lateral opening speculum, syringe in metal guard with in injector, sound with cervical stopper. Fig. 2.—Normal uterus and tubes. Fig. 3.—Free opaque liquid (lipiodol) in the abdomen controlled after 24 hours. In a case of permeable tubes. Fig. 4.—Bilateral hydro-salpinx. After 24 hours no free lipiodol is in the abdomen, only uterine fluid. Fig. 5.—Complete obstruction of both tubes. Fig. 6.—Complete obstruction of the uterine wall and the ovum. Fig. 7.—Malformation —Uterus bith. Fig. 8.—Malformation —Uterus bith. Fig. 9.—Malformation —Uterus bith.

not be too insistent, even if some fluid is left in the syringe.

*Constant measure of the pressure with the manometer.*—As simple as this procedure may seem, it must be remembered that our guide is the hand on the gauge, and the pressure must not exceed 30 to 35 cm. of mercury. When this maximum is attained and the opacity is not sufficient, if the pressure on the piston is removed the hand-gauge will return gradually to 25, 20, 10, 5 cm., and more fluid is reinjected without danger or accident. It is absolutely necessary to keep in mind that it is indispensable to constantly measure the pressure we are forcing upon the soft organs, in order to avoid possible accidents.

*When should radiograph be made?*—Often-times but one film will prove sufficient to help us elucidate a diagnosis. The film should be taken when the injection is completed. On the other hand, considerable information may be obtained from films taken at earlier stages of the injection, but a later one, when the full quantity of fluid has been injected, must always be taken. By comparison, data of considerable help will be secured. In cases of uncertainty of the permeability of the tubes an x-ray taken after twelve to twenty-four hours may reveal the presence or the absence of free opaque fluid in the abdominal cavity.

Profile negatives may be useful in particular cases, but the patient must be set completely on her side and not in an incomplete profile. In cases of tumour it is advisable to establish the contours of it by encircling it with a lead wire.

#### ACCIDENTS IN UTERO-SALPINGOGRAPHY

We have been fortunate in not having encountered any serious accident. Before the advent of B  cl  re's manometered instrument we once had a case of slight peritonism for a few days following the injection. The patient complained of abdominal pains, with temperature up to 101  , but rest, ice bags, and douches soon relieved this condition; it was a case of obstructed tubes. The pressure must have been too great for the condition of the organs. Severe pains, peritonitis, loss of consciousness have been reported. We are of the opinion that none of these should occur with a correct technique, meticulously followed, and the observation of the contraindications.

#### CONTRAINDICATIONS

Contraindications for utero-salpingography are not numerous and can be summarized in three conditions.

1. Acute inflammatory conditions of the pelvis. We can readily conceive that any manipulation of the inflamed organs may bring about severe reactions in the peritoneum.

2. Pregnancy, ascertained, or even doubtful. Abortion may follow this injection; it has even been suggested in some countries to use this aseptic procedure as a means of bringing about the termination of a pregnancy. I say, *may*, because some cases of pregnancy have been interrupted by this method, but it is not to be advised (Fig. 7).

3. Severe h  morrhage. If very striking cases of menorrhagia and metrorrhagia may be diagnosed by utero-salpingography, it is important to remember that it is not during a period of severe h  morrhage that this procedure should be carried out.

#### INDICATIONS FOR UTERO-SALPINGOGRAPHY

The anamnesis, the family history, the physical examination, will always be the indispensable elements in formulating a diagnosis. All laboratory means, be they biological, clinical or electrical, will never supplant the clinical. They will help in co-ordinating the data obtained in making a precise diagnosis; they must never take the forefront in confirming a diagnosis.

#### DIAGNOSIS

With this in mind we can enumerate four conditions, in which utero-salpingography will become a valuable adjunct to the clinical examination in formulating a diagnosis. These are: sterility; congenital malformations; tumours; uterine h  morrhages.

*Sterility.*—Until the advent of utero-salpingography we had no particular means of giving definite assurance of the cause of certain cases of feminine sterility. If some cases still remain unsolved, yet we may ascertain in a great number that it is due to a special deviation, stenosis, obstruction, or malformation of the uterus, or, more often, to occlusion or stenosis of the tubes.

The shadow of the injected uterine cavity will reproduce instantly the interior moulding of the uterus. By its interpretation we may judge of some causes of sterility. If these may not be frequent, tubal obstruction or occlusion, partial or total, will prove still more certainly

the impossibility of fecundation. Moreover it will give the exact region where the obstruction lies, interstitial, isthmie, ampullar or fibrillar. If surgical attempts are made to remove this obstruction no delay is encountered, no hesitation is necessary to choose the correct area which must be dealt with. Moreover, according to the seriousness of the occlusion, we may use medical therapeutic manœuvres, such as a slight attempt at increasing the pressure of the injection or a tubal insufflation (Fig. 6).

Doubtful cases are controlled after a delay of from 12 to 24 hours when a certain quantity of opaque liquid will be easily seen freely located in the peritoneum between the bowels, showing the permeability of the tubes (Fig. 3).

We have often seen cases of sterility which have been cured by this particular form of examination: the slight trauma exercised by this procedure unplaited the fringes of the tubes and fecundation was possible.

There is no doubt that all cases of feminine sterility should benefit by such a test: it may prevent serious accidents or unnecessary operations which otherwise we might have been tempted to undertake.

*Congenital malformations.*—If it is often easy to diagnose what I would call definite cases of malformation such as complete double vagina, cervix and uterus it is not so when there is but one vagina and one cervix, and we hesitate in the formulating of a diagnosis. Here, utero-salpingography will definitely outline the exact aspect of the internal organs, and therapeutic measures will ensue which otherwise might not have been undertaken, or vice versa (Figs. 8 and 9).

*Tumours.*—It might be risky to venture a differential diagnosis of tumours by x-ray, but with the aid of the clinical information collected by the anamnesis and the physical examination it is sometimes possible to eliminate one or two varieties of suspected tumours and retain one variety by the particular aspect of the shadows of the uterine cavity.

Every one of us has often hesitated in writing fibroma, or cyst, or carcinoma, or polypi at the bottom of a record file as a diagnosis. Cases of cysts with severe hæmorrhages, cases of fibromyomata with normal menstrual cycles; laparotomies for tumours that were large chronic hydro-salpiux—we have all and every one of us encountered them. It is poor surgery merely to think of the technique, its easiness, and not

insist on the importance of defining the diagnosis. Utero-salpingography will help obtain this precision (Fig. 5).

*Uterine hæmorrhages.*—Utero-salpingography will certainly be most helpful in all cases of uterine hæmorrhages of doubtful origin. True, a fibro-myoma of some volume or an exteriorized polypus can easily be diagnosed, and no complementary utero-salpingography will serve a useful purpose. On the other hand, many cases of suspected submucous myomata, polypi, cancer of the body or the internal cervical os, endometritis, hypertrophied mucosa of the premenopausal stage, will readily be diagnosed and appropriate treatment instituted, either surgical or medical. Where a major operation would have been performed we have sometimes limited the procedure to a curettage. Other cases have benefited by radiotherapy, or medical treatment.

The interpretation of a shadow can only be acquired after some numerous readings of negatives. With the aid and ability of the radiologist who serves as a consultant, the gynecologist with his knowledge of the anamnesis and his clinical findings will confirm or disprove an uncertain laboratory report. It is best to help the radiologist by sitting in at the time of the reading of the negatives. In this manner unnecessary waste of time and energy, and duplication of reports will be avoided.

I have prepared a series of utero-salpingographies amongst the hundreds we have done at the gynecological department of the Notre-Dame Hospital (see Figs. 2 to 9). Every one of the reports has been controlled by either a curettage or a major operation. We now believe that in many cases the curettage will be abandoned, especially in those cases where we have found a picture of hypertrophied mucosa in the pre-menopausal stage. The institution of adequate glandular treatment has given us results satisfactory enough as not to warrant surgical manœuvres. Polypi have been removed by curettage when sometimes the gravity of the hæmorrhage would have suggested a hysterectomy in the fear of some form of malignancy.

Briefly, utero-salpingography has come to our aid in confirming or disproving suspected lesions. We do not wish to infer that in all cases we have not erred in formulating a diagnosis. It has taken us some time to interpret correctly shadows of doubtful nature. The harmlessness of the technique deserves more attention than a mere



approval of this method. We hope gynaecologists will use it with advantage and report on their findings, difficulties, errors and accidents, if any.

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## PLASTIC REPAIR OF DEFORMITIES OF THE EYELIDS\*

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THREE cases are presented to show typical deformities of the eyelids, each one presenting a different problem.

## CASE 1

H.S., aged 12 years, male, was injured in an automobile accident and suffered a depressed fracture of the skull and lacerations of the right side of the face. Contraction of the resulting scars pulled down the outer half of the lower lid so that he had a marked cicatricial ectropion. There was a scar through the eyebrow, with some loss of skin over the upper lid and also considerable loss of tissue over the zygoma. The condition was corrected as follows.

**Technique of operation (Fig. 1A).**—An incision was made about 3 mm. below the margin of the lower lid, running parallel to it, and out past the external canthus. The dissection was carried down to the underlying tissues until the lid was quite free from the scar tissue and the edge of the lid could be held in apposition against the upper lid. This left a raw area about 20 mm. long and 10 mm. wide. A lid adhesion was then put in to protect the cornea and prevent contraction (Fig. 1B). An area 8 mm. long was marked out on the edge of the lower lid and the epithelium removed by means of the scalpel. A corresponding area was marked out on the upper lid and the epithelium removed. A mattress suture was put in, starting through the skin of the lower lid and out through the raw area into the denuded area on the edge of the upper lid and out through the skin. The sutures were tied over a piece of aluminum which is much less irritating to the skin than rubber. The area to receive the graft was measured and a corresponding area marked out on the upper lid of the opposite eye. A full thickness graft was removed by scissors, care being taken not to include any of the subcutaneous tissue. This graft was then secured with interrupted sutures, the corners being fastened first, and the needles introduced through the skin surface of the graft so that it was not necessary to use forceps (Fig. 1B). The skin of the other lid was sutured together. A firm pressure dressing was applied over the graft and was not disturbed for 5 days. Then the sutures were removed from the lid. The graft appeared pink although there was a certain amount of epithelial slough. Pressure was maintained for another week and then the patient was instructed

to massage the graft with a little vaseline. The lid adhesion remained *in situ* for four months, until there was no tension on the lower lid. Only a local anesthetic was required when the adhesion was released by cutting with scissors, and its site was obliterated in two or three weeks.

## CASE 2

D.H., aged 4 years, female, had congenital ptosis of the lids and a very narrow palpebral fissure. The fold of skin forming the epicanthus was very tense, and part of the ptosis was due to the tightness of the skin of the lids. The child held her head well back in order to see. The first problem was to repair the epicanthus. I have always felt that epicanthus was due to tension of the fold of skin and that if this were relieved the epicanthus would disappear. Most of the procedures to repair epicanthus are involved. The technique which I have adopted is extremely simple, but I have not been able to find it mentioned in the literature, perhaps because it is so simple that many are doing it but have never considered it worth reporting.

**Technique of operation (Fig. 2A).**—Under a general anesthetic the lacrimal probe was put in the lower canaliculus, and a horizontal incision about 1 cm. long was made running medial from the internal canthus through the epicanthus. It extended deep enough to relieve the tension of the fold, care being taken not to cut through the canal. The incision immediately separated and the fold became lax. It was then sewn up vertically (Fig. 2B), and the resulting scars blended in with the natural lines around the eye.

Following this operation the child was able to open her eyes better, but still had considerable ptosis. The latter was repaired by fascia lata ligaments, according to the method described by Wright,<sup>1</sup> a method which gives very satisfactory results in congenital ptosis, if properly done. The upper margin of the tarsus was suspended to the frontalis muscle with thin strips of fascia lata. The child is now able to open the eyes and her appearance is much improved.

## CASE 3

J.R., aged 4 years, female, had been born without a left upper lid. The cornea was completely exposed. At the outer canthus was a remnant of the upper lid with a few lashes along the edge. No conjunctival fornix existed in the upper inner part of the orbit and the limbus adhered to the skin just under the eyebrow. This adhesion limited the movement of the eyeball.

This case presented several interesting problems. Firstly, it was necessary to protect the cornea during the series of operations; secondly, to free the adhesions

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between the eyebrow and the cornea, and to provide a fornix with epithelial tissue; thirdly, to provide new tissue for the lid which would be lined with conjunctiva.

**Technique of operation.**—It was found that the remnant of the lid could be pulled over to cover about one-half of the cornea. A permanent adhesion between the lower lid and the upper lid, as described in case 1, was then made so that the cornea was partially covered (Figs. 3B&C). The eyeball was freed from the brow by an incision 8 mm. long parallel to the limbus and about 3 mm. from it (Figs. 3A&B). The conjunctiva was then undermined freely on the upper half of the globe and the incision sewn up vertically, that is, at right angles to the limbus. This procedure was repeated a month later, and the eyeball was then freely movable. The mother was advised to massage the lid with vaseline and to try to stretch the lid across the

movable upper lid. The lid adhesion was cut six months later. The interesting thing is that the cornea, which was opaque when it was exposed, is now quite clear and the vision fairly good.

#### DISCUSSION

Plastic repair of deformities about the eyes will not always restore the condition to normal, and the results are sometimes discouraging both to the doctor and the patient. The best that can be hoped for is to improve the appearance, and to achieve that end this type of plastic surgery requires special consideration. Care must be

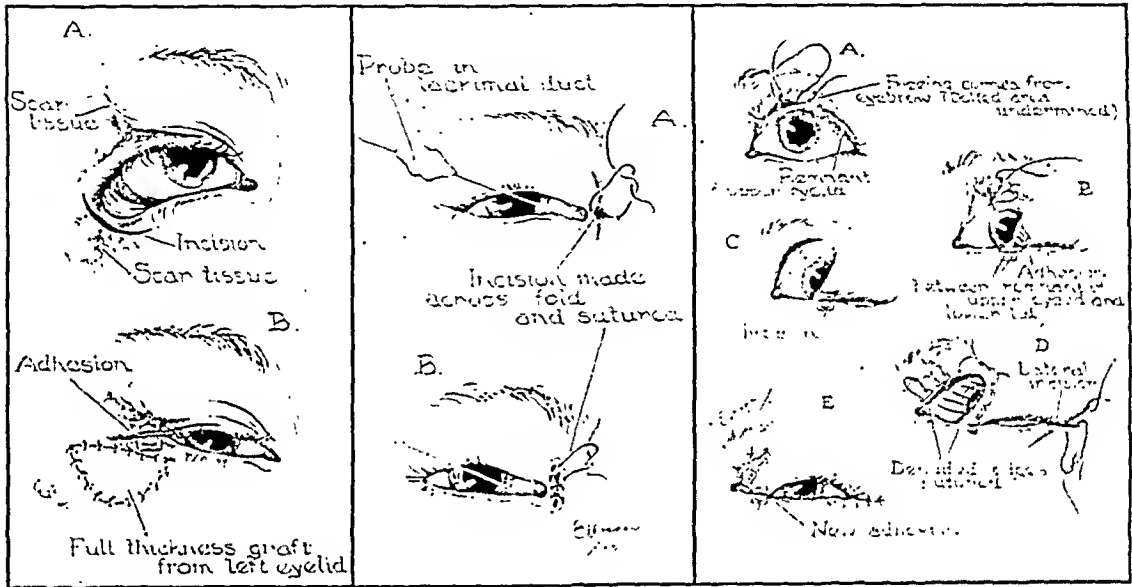


Fig. 1

Fig. 2

Fig. 3

**Fig. 1. (Case 1).**—Repair of cicatricial ectropion of the right lower lid, with full thickness grafts from the left upper lid. (A) Showing site of scar tissue and incision. (B) Lid adhesion and graft in place. **Fig. 2. (Case 2).**—Repair of epicanthus by (A) horizontal incision across epithelial fold. (B) Incision sewn up vertically to relieve tension. **Fig. 3. (Case 3).**—Repair of congenital coloboma of the left upper lid, with sliding graft. (A) Making a new conjunctival fornix with conjunctiva of the same eye. (B) Conjunctiva is undermined and incision sewn up at right angles to limbus. (C) Furrow made to receive edge of coloboma, which is denuded of epithelium. (D) Lateral incision from the outer canthus, to allow lid to slide medially. (E) Lid in place secured with mattress sutures.

cornea by massage. In a few months' time there was almost enough tissue to cover the defect. A groove was made from the edge of the coloboma medially down to the inner canthus, and the epithelium denuded from the medial edge of the coloboma (Figs. 3C&D). An incision was made through the skin from the outer canthus laterally about 20 mm. It was then found that the lid could be pulled over across the eyeball and fit into the groove prepared for it, and that there was enough conjunctiva underneath the outer side of the flap without further dissection. The flap was advanced by placing sutures which pulled it over the cornea when tied. The edge of the flap was secured by a mattress suture tied over aluminum. The original adhesion between the lid margins was cut and a new one placed in a slightly different location so that the cornea was completely covered (Fig. 3E). The conjunctiva and the edge of the skin were sutured at the outer margins of the lid and the incision in the skin closed with silk sutures. A pressure dressing was applied for 10 days and then the sutures were removed. The flap held nicely, and she now has a

taken not to make new scars which will prove more unsightly than the original ones. If possible, incisions should run in the same direction as the fibres of the orbicularis muscle.

Cicatricial ectropion of the lower lid, as in case 1, is usually the result of accidents in which there has been a loss of tissue with contracting scars and traction downward of the lower lid. The lid margin is often intact. In the area bounded by the orbit the skin is of a different texture and pigmentation from that of other parts of the face; therefore, grafts from other parts of the body, as behind the ear or under the arm, show a contrasting colour. Hence, the best source of skin is from the upper lid of either the

same or the opposite eye. There is plenty of loose skin in this situation, and grafts 40 mm. long and 20 mm. wide can be obtained. The grafts should contain nothing but skin. These full thickness grafts take well. Pedicle grafts are usually unnecessary. All bleeding on the surface to be grafted must be stopped before applying the grafts, as any hæmorrhage under the graft prevents proper adhesion. Before applying the pressure dressing, the best material to use directly over the graft is a thin layer of perforated cellophane, lightly smeared with vaseline. This method was first described by Wheeler<sup>2</sup> in 1920, and gives excellent results.

Lid adhesions perform a very important duty; they protect the cornea, and prevent post-operative contraction of the graft. They should be used to prevent corneal ulceration in any type of operation which requires a pressure dressing. It is usually unnecessary to have more than two, one on each side of the pupil. The adhesions stretch slightly and the patient is able to see through the slightly open fissure.

Grafts forming a new lid must be lined with mucous membrane to prevent contraction. Conjunctiva is better than buccal mucous membrane as it forms a smoother surface. There are several ways to repair ptosis of the lids, all based on three main types: (a) Suspension of the tarsus from the frontalis muscle; (b) shortening of the

levator palpebrum; (c) use of the superior reetus.

Type (a) should be used when there is a unilateral paralysis of the levator or narrow palpebral fissures. Type (b) can be used only when there is some action of the levator. Type (c), when there is bilateral ptosis due to levator paralysis but no mechanical restriction of movement of the upper lid.

Fascia lata is an excellent material to use in suspending the upper margins of the tarsus to the frontalis muscle. It does not stretch nor undergo absorption. Wright modified his original methods so that the technique is much simpler.

### CONCLUSION

The techniques of repairing a case each of (1) cicatricial ectropion of the lower lid; (2) ptosis with epicanthus; (3) congenital coloboma of the upper eyelid, and special points in the plastic surgery of these cases are discussed.

It is suggested that plastic surgery around the eye should be considered the province of ophthalmologists.

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## THE INTERPRETATION OF ACUTE ABDOMINAL PAIN\*

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THE often-quoted statement of Hilton<sup>1</sup> that "Every pain has its distinct and pregnant signification if we will but carefully search for it" is as true today as when it was written nearly a century ago. It applies with particular emphasis to abdominal disease. When we recall that intestinal obstruction still carries a 40 per cent mortality, and that over 20,000 people die each year in America from appendicitis we must acknowledge the justification for the numerous discussions in the literature regarding the diagnosis of acute abdominal pain. John Hilton's dictum demands from us a *thorough and systematic* study, both of the history and the clinical

findings, in each case, together with a just appreciation of laboratory aids. The doctor should not be tempted to make a snap diagnosis which may appear ever so brilliant, but so often turns out to be wrong. Too frequently a perfunctory examination is followed by the use of a laxative, or a narcotic, or a decision to "wait until morning". Purgation, palliation and procrastination are three sign posts surely pointing to disaster. Guerry has well said that morphine puts two people to sleep, the patient and the doctor.

The cause of acute abdominal pain may exist within the abdominal cavity or without, and each case requires consideration of all possibilities. This involves a careful study of the pain, its character, location, onset and duration, radia-

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tion, and its relation both to anatomical and functional processes, and also to the objective findings.

#### INTRA-PERITONEAL

Zachary Cope<sup>2</sup> lays down the general rule "that the majority of severe abdominal pains which ensue in patients who have been previously well, and which last as long as six hours, are caused by condition needing surgical intervention".

If the cause is intra-abdominal, it should fall into the following classification: colic; hæmorrhage; obstruction and torsion; perforation, and inflammation. In colic and obstruction there appear rhythmic crampy pains and emesis, without pyrexia, and without tenderness and rigidity. On the other hand, hæmorrhage, perforation and inflammation cause pain that is almost always associated with tenderness and rigidity.

With biliary colic the pain is located in the right epigastrium and characteristically radiates to the scapular angle. It is accompanied by repeated efforts at vomiting. When inflammation is added, the palpating hand will discover the tenderness described by Murphy. A suggestive past history of biliary dyspepsia can almost always be secured.

Tubal colic causes pain confined to the lower belly. There is usually a history of a missed menstrual period, and also of a nagging pain prior to the acute seizure. Careful pelvic examination demonstrates a tender mass, and vaginal hæmorrhage may be noted. When rupture occurs, the signs of perforation and hæmorrhage are quickly added.

*Hæmorrhage.*—The sudden irritation of the parietal peritoneum caused by the spilling of blood into the cavity results in the abrupt onset

TABLE I.

## COLIC

	Character	Location	Duration	Radiation	Relations	
					Anatomy and functions	Objective findings
BILIARY....	Terrible, griping; crampy.	Right costal margin.	Sudden onset. Intermittent. Rhythmic.	1. Scapular angle. 2. Shoulder point occasionally	1. Patient restless, writhing. 2. Repeated emesis and retching. Past history.	No rigidity, perhaps some tenderness in R.U.Q. (unless inflammation).
RENAL AND URETERAL.	Terrible, griping; crampy.	C-V angle and flank.	Sudden onset. Intermittent. Rhythmic.	Downwards towards the pubes.	1. Patient restless, writhing. 2. Emesis. 3. Urinary frequency. 4. Dysuria.	No rigidity, perhaps some tenderness. Blood in urine.
TUBAL.....	Moderate, griping; crampy.	Hypogastrium.	Sudden onset. Intermittent. Rhythmic.	Nothing characteristic.	1. Patient restless. 2. Emesis. 3. Disturbed menstrual cycle.	No rigidity, perhaps some tenderness. P-V: - tender mass.

*Colics.*—Colic is an acute visceral pain due to increased tension or exaggerated peristalsis in a hollow muscular organ; and it is characterized by the abrupt onset of severe cramps, rapidly reaching an acme and rapidly subsiding, to give place at most to a residual soreness which remains until another paroxysm arises. The patient is often doubled up with the pain. Emesis quickly follows and is repeated, so that we have a vivid picture of restlessness and retching. The temperature and pulse may be unchanged, and, since the parietal peritoneum is not involved, there is no rigidity and little tenderness. The symptoms are striking, the findings surprisingly slight.

of acute pain over the involved region, and, in addition to the muscle-guarding which accompanies this pain, there are evidences of blood loss, pallor, sweating, anxiety, soft rapid pulse, restlessness and even air hunger. The temperature and the leukocyte count are of no help in early stages. The commonest example is ruptured tubal pregnancy, and it demonstrates a combination of perforation, hæmorrhage, and aseptic peritonitis. There is sudden hypogastric pain with tenderness, but only slight rigidity. One obtains a history of a missed menstrual period and usually of minor colicky pains preceding the acute attack. Uterine bleeding occurs in 80 per cent of cases. Pelvic examination

TABLE II.  
HÆMORRHAGE

	<i>Character</i>	<i>Location</i>	<i>Duration</i>	<i>Radiation</i>	<i>Relations</i>	
					<i>Anatomy and functions</i>	<i>Objective findings</i>
RUPTURED TUBAL PREGNANCY	Steady and severe.	Hypogastrium.	Sudden onset, steady.	None.	Patient lies still and white. A missed period. (Perhaps a history of preceding colic).	Vaginal bleeding. Signs of hæmorrhage. Very tender belly, rigidity less marked. Mass palpated.
RUPTURED OVARIAN FOLLICLE	Steady, only moderate or severe.	Hypogastrium.	Sudden onset, steady.	None.	Patient lies still. Periods not disturbed.	Very tender hypogastrium. Rigidity less marked. Occasionally signs of blood loss.
SPLEEN OR LIVER.	Steady; dull or sharp.	Over area.	May be sudden or slower; but continuous.	None.	Patient lies still.	Very tender, some rigidity—may be marked. Evidence of blood loss. History of injury.

usually reveals a boggy mass, thus clinching the diagnosis. Signs of bleeding are apparent, although the bowel, floating upward on the fluid blood, masks hypogastric signs of fluid.

Hæmorrhage from an ovarian cyst gives a similar pain of less intensity. There is, of course, no disturbance of the menstrual cycle.

Similar findings in the upper abdomen occur

with hæmorrhage from the spleen or liver. Occasionally free intra-peritoneal fluid can be demonstrated. There may be a history of trauma preceding the hæmorrhage by hours, days or, rarely, even weeks.

*Obstruction.*—Intestinal obstruction gives rise to sudden colic referred vaguely about the navel. The temperature is normal or subnormal, and

TABLE III.  
OBSTRUCTION

	<i>Character</i>	<i>Location</i>	<i>Duration</i>	<i>Radiation</i>	<i>Relations</i>	
					<i>Anatomy and functions</i>	<i>Objective findings</i>
UPPER SMALL GUT. ....	Severe, griping, colicky.	Vaguely about navel.	Often acute onset. Rhythmic.	None.	Patient writhing and restless. <i>Emesis</i> —early, frequent—intestinal. <i>Bowels</i> —blocked. <i>Shock</i> —early dehydration and electrolyte loss.	No tenderness. No rigidity. Shock. X-ray patterns. Hyperperistalsis Tinkle. Rarely a mass.
LOWER SMALL GUT. ....	Severe, griping, colicky.	Vaguely at navel.	Often acute onset. Rhythmic.	None.	Patient restless. <i>Emesis</i> —soon, not so profuse, but repeated. Intestinal. <i>Bowels</i> —blocked. <i>Shock</i> —not so early.	No tenderness. No rigidity. X-ray patterns. Hyperperistalsis Tinkle. Enemas fail. Distension later. May palpate a mass.
COLON. ....	Severe, griping, colicky.	Vaguely below navel.	Often acute onset. Rhythmic.	None.	Patient restless. <i>Emesis</i> —much later; absent for days. <i>Bowels</i> —blocked. No shock.	No tenderness. No rigidity. Hyperperistalsis. Enemas fail. X-ray patterns. Distension later. May palpate a mass. Barium enema.

(NOTE: Tenderness and rigidity with rising pulse and white blood cell count bespeak strangulation and peritonitis)

the leukocytes are not increased. The frequency and character of the emesis varies with the site of the obstruction. High small gut blockage is accompanied by early, frequent and copious vomiting which soon becomes feculent, and which induces a degree of shock from the loss of fluids and electrolytes. This appears later and is less marked if the obstruction is lower down. When it is in the colon there may be no emesis, and the shock does not appear until late. There is no tenderness, but increased peristalsis can often be seen, palpated, and auscultated. The peculiar tinkle, loudest at the site of the obstruction has been emphasized by Wangenstein<sup>3</sup> and others as a valuable sign. Except for this, abdominal examination may be entirely negative. Distension is a later sign, and to wait for it is to court disaster. An x-ray plate of the abdomen is invaluable, as it will show the patterns of gas and fluid levels characteristic of blockage of the small or of the large gut. Sometimes a mass is palpated, indicating the portion of gut involved, *e.g.*, external hernia; the tumour of intussusception; of volvulus; of neoplasm. After one or two enemas there is no more success; obstruction is complete; no feces and no gas are returned. Occasionally a barium enema may be employed to demonstrate the site of a large bowel

obstruction. Barium by mouth must never be given because of the imminent danger of making a partial obstruction complete. If tenderness and rigidity develop along with a rapidly increasing pulse-rate, we are warned of the onset of strangulation.

Mesenteric vascular occlusion gives rise to abrupt intestinal obstruction accompanied by profound shock. The hemorrhagic infarction is quickly followed by the distension of ileus and at times evidence of free peritoneal fluid. As stated by Cockkinis,<sup>4</sup> melæna occurs in approximately 50 per cent of cases. Failure to diagnose this comparatively rare catastrophe is mitigated by the fact that the patient is usually operated upon for obstruction and the true cause of the lesion is thus quickly revealed.

*Perforation.*—The characteristic picture of perforation of a viscus is that of the sudden onset of severe, steady pain, accompanied immediately by tenderness and rigidity that varies with the kind of fluid causing the peritonism, whether it be blood, gastric or intestinal content, or purulent material.

With ruptured peptic ulcer there occurs an abrupt, agonizing epigastric pain, severe enough to prostrate the patient, who lies still almost immediately and pleads not to be touched. The

TABLE IV.  
PERFORATION

	Character	Location	Duration	Radiation	Relations	
					Anatomy and functions	Objective findings
PEPTIC ULCER....	Agonizing.	Epigastric.	Dramatic onset. Continuous; (latent period).	None.	Patient lies flat! Won't move! <i>Emesis</i> —once sometimes. <i>Shock</i> — <i>Ulcer History</i> — sometimes.	Tenderness! Rigid- ity! (even in the second stage). Rigidity spreads from original epi- gastric area. Gas bubble percussed x-ray plate. Blood and temper- ature negative.
TUBAL PREGNANCY	Severe and steady.	Hypo- gastric.	Sudden onset. Steady.	None.	Patient lies still. Missed period. (Perhaps a history of antecedent colic).	<i>Peritonism</i> — Tenderness. Some rigidity. <i>Signs of blood loss.</i> <i>Vaginal bleeding.</i> <i>Pelvic mass</i> — Tender, boggy.
MECKEL'S or SIGMOIDAL DIVERTI- CULITIS....	Severe and steady.	May be localized over involved area; may be general.	Premonitory signs com- mon. Then sudden steady pain.	None.	Patient lies still. Perhaps disturbed bowel habit.	<i>Peritonism</i> — Tenderness. Rigidity varies with size of parietal involvement. Abscess. Occasionally peri- tonitis general.

temperature may be normal or subnormal, the pulse normal or slightly raised. He may vomit perhaps once. There is exquisite tenderness and board-like rigidity over the affected part. This acute stage may be followed by a latent period in which the patient feels much better, but the rigidity is still unmistakable. Gradually the third stage of spreading peritonitis, with rising fever and leukocytosis supervene. Diminished hepatic dullness, due to a gas bubble, may be demonstrated when one percusses in the axillary lines, and this can be visualized by an x-ray plate in perhaps 75 per cent of cases. It is unfortunate that a history of previous ulcer dyspepsia can be obtained in only half of such cases. We should note that its dramatic onset distinguishes perforation from other types of intra-peritoneal inflammation, while the rigidity and the still attitude distinguish it from the colic of obstruction.

Ruptured tubal pregnancy gives a less severe degree of shock, but the story of sudden severe low abdominal pain, accompanied by hypogastric tenderness, some rigidity, and evidence of blood loss, is suggestive. Enquiry reveals the fact that a menstrual period has been missed, and there probably have been premonitory attacks of mild tubal colic. Pelvic examination shows a tender mass, and usually a bloody vaginal discharge.

*Acute intra-peritoneal inflammation.*—Inflammation shows itself by the development of abdominal pain which gradually reaches an acme. In local lesions of this type it is at first visceral in type and only vaguely localized. Later parietal pain is noted, associated with some tenderness and rigidity.

In primary peritonitis, usually found in children, we get the history of a gradually developing abdominal pain associated with progressive

TABLE V.  
INFLAMMATION

	Character	Location	Duration	Radiation	Relations	
					Anatomy and functions	Objective findings
APPENDICITIS.....	1. "Bellyache" or colic. 2. Sharp local pain.	1. Navel. 2. R. L. Q.	1. Usually sudden onset. 2. Appears somewhat later. (Rarely starts in R. L. Q.)	None.  None.	Patient lies still. <i>Emesis</i> —not immediately; usually once or twice. Rarely precedes pain. <i>Bowels</i> —often unaffected. <i>Urine</i> —occasionally dysuria	Usually tender and foecal rigidity. This differs in pelvic and retrocecal types. White blood cells—slightly up. Accessory signs: Rebound; Rovsing's; Cope's. Rectal.
CHOLECYSTITIS.....	Severe; sometimes colicky.	R. U. Q.	Onset may be gradual. Colicky or steady.	1. Scapular angle. 2. Shoulder point.	Patient may be restless, or may be still. <i>Emesis</i> —repeated—"retching". (Past history)	Tenderness and rigidity in R. U. Q.
SALPINGITIS	Sharp pain.	Hypogastric; bilateral, but one side may be worse.	Gradual onset, continuous.	None.	Patient lies still. Not as ill as appendix. <i>Emesis</i> —not repeated. <i>Menses</i> —may have been disturbed. Vaginal discharge.	Patient may not appear very ill. Pain and tenderness in hypogastrium. P-V:—tender mass. Vaginal smear. White blood cells—may be high.
PANCREATITIS.....	Excruciating.	Across epigastrium, not merely in R. U. Q.	Often sudden onset, continuous.	May be through to back on left side; up to shoulder.	Patient usually still. <i>Emesis</i> —often repeated. (May be past history of biliary dyspepsia)	Shock; cyanosis. Pulse—rapid and soft. Soon have pain and tenderness of an epigastric peritonitis. Loewi's sign. Early diastase.
PRIMARY PERITONITIS....	Sharp, steady pain.	Across abdomen.	Gradual onset, reaches maximum in a few hours.	None.	Patient lies still. <i>Emesis</i> —may be repeated often. <i>Bowels</i> —diarrhoea sometimes.	Patient very ill. Tender and rigid. High temperature and white blood count.

tenderness, rigidity, and high fever and leukocytosis.

Acute appendicitis, which accounts for perhaps 75 per cent of acute abdominal lesions, is recognized by the appearance of the following, in the order described by John B. Murphy:<sup>5</sup> (1) abdominal pain; (2) nausea and emesis; (3) iliac tenderness; (4) fever; (5) leukocytosis. It is commonest in adolescence and young adult life; it is rare under two years, though not so rare over sixty. The first pain, visceral in type, commences as a sharp, steady or colicky pain vaguely ascribed to the umbilical region. Its onset, while not dramatically acute, is usually definite enough for the patient to be able to tell the hour of its inception. Emesis does not occur for some little time after the pain began, and may be absent altogether. Rarely does it precede the pain. Still later the pain shifts to the right lower quadrant, and usually becomes more acute. It should be noted that the acute pain seldom commences in this area. Tenderness and rigidity appear only if the parietal peritoneum is irritated. But if the appendix lies in the pelvis, or behind the cæcum, or beneath loops of ileum and omentum, these signs may be missing, or, at all events, not clear cut. In these varieties, lumbar tenderness or tenderness on rectal examination may direct us to the diagnosis. This latter step must never be omitted from our routine. As Cope so well says, a finger in the rectum is often of much more help than a thermometer in the mouth. The temperature and blood count are very variable. Normal readings have no significance. Pyrexia over 102° in an early case or a leukocytosis over 10,000 should suggest some other lesion, such as pyelitis, salpingitis or pneumonia.

Acute cholecystitis usually occurs in a middle-aged patient who gives a past history of gall-bladder dyspepsia. There is now a sharp, steady or colicky pain in the right upper quadrant, often radiating to the angle of scapula. There may be oft-repeated attacks of vomiting and retching with aggravation of the pain. Jaundice is not often noticed. There is moderate fever and leukocytosis. Examination shows tenderness and rigidity over the right costal margin.

Acute salpingitis occurs in a woman of child-bearing age, giving a history of an indefinite onset of low abdominal pain which later has become sharp. It may be accompanied by vaginal discharge and dysuria. She lies still in bed with fever and leukocytosis higher than

ordinarily seen in appendicitis, and yet she may not look very ill. Examination reveals abdominal, and especially pelvic, tenderness which is usually bilateral. Palpation of a tubal mass and the finding of a positive vaginal smear clinches the diagnosis.

Acute inflammation of Meckel's diverticulum resembles appendicitis so closely that it is seldom possible to differentiate it. Operation permits its removal provided the surgeon remembers to search for it, if in a case where the symptoms suggested appendicitis he finds no evidence of disease in the appendix.

Sigmoidal diverticulitis is an uncommon condition, aptly described as "left-sided appendicitis". Occurring in middle age, its symptoms and signs are similar to those of appendicitis. The bowel is commonly ruptured before operation.

Acute pancreatitis. In this condition the middle-aged patient may give a past history of indigestion, but the striking element is the sudden onset of severe pain across the epigastrium, not merely in the right upper quadrant but, as emphasized by Cabot,<sup>6</sup> reaching over to the left side, and causing great shock. The pain may radiate through to the back and up to the left shoulder. The pulse is soft and rapid, the temperature subnormal. There is repeated retching and vomiting, and the patient may appear cyanosed. Early examination may show no rigidity until the parietal peritoneum has been involved; then we get signs of an epigastric peritonitis. In a few cases, examined later, discoloration may be recognized in the left flank. Loewi's mydriatic test may be of assistance if it is positive. If a diastase test can be secured within the first twenty-four hours it may show a marked elevation, perhaps ten times the normal.<sup>7</sup> Pancreatitis is distinguished from cholecystitis by its greater severity, the shock, and by the fact that the pain is felt across the epigastrium, and not merely at the right costal margin.

#### EXTRA-PERITONEAL

If the cause is extra-peritoneal it may be due to some constitutional disease or to some local lesion outside the abdominal cavity. No matter what the cause, there is always a dissociation of the pain and the tenderness and true rigidity. False rigidity can be detected by noting (some-time during the respiratory cycle) a definite,



TABLE VI.  
EXTRA-ABDOMINAL LESIONS

Hæmorrhage into rectus muscle. Palpate mass.				
<i>In front of peritoneum</i>				
<i>Behind the peritoneum</i>	<i>Urinary calculus</i> Colic—from loin to pubes. Dysuria and frequency. Blood in urine. No true rigidity.	<i>Pyelitis</i> Pain—from loin to pubes. Dysuria and frequency. High temperature and high white blood count. Chills often precede pain. Pyuria. No true rigidity.		<i>Tabes dorsalis</i> Retching. Absent reflexes. Normal temperature and white blood count.
<i>Below the peritoneum</i>	<i>Epididymitis</i> Tender tumour. Urethral discharge. No tenderness nor rigidity.	<i>Tumour of testicle</i> Tumour palpated. Occasionally the retroperitoneal nodes are tender.		
<i>Above the peritoneum</i>	<i>Respiratory</i> Pneumonia, pleurisy; pneumothorax. Mode of onset. High fever and white blood count. Pulse—Respiration ratio. Alæ Naris. Chest findings (fixed diaphragm). No true rigidity.	<i>Coronary disease</i> Sudden; epigastric and thoracic. Shock, cyanosis, fear; "tapping" pulse. Temperature; white blood count; E.C.G. later. No true rigidity.	<i>Intracranial lesions</i> Neurological findings. No true rigidity.	
<i>Constitutional</i>	<i>Erythematæ</i> High temperature and white blood count. High lymphocytes. No true rigidity.	<i>Typhoid; Malaria</i> Onset and history. Leukopenia. Laboratory findings. No true rigidity.	<i>Lead colic</i> Blue line on gums. Basophilia. Response to intra-venous calcium. No true rigidity.	<i>Allergies</i> Henoch's purpura. Diabetic coma. Uremia. Cyclic vomiting All show dissociated pain and tenderness.

tell-tale relaxation of the muscle guarding that may be present.

The eruptive fevers, typhoid fever, and influenza occasionally exhibit abdominal manifestations. Likewise some allergies, the acidosis of diabetes and of uræmia, malaria, and Henoch's purpura are causes of abdominal pain. Lead poisoning ought to be mentioned as a cause of afebrile abdominal colic. In this condition the history of the patient's occupation, the blue line on the gingivæ, and the therapeutic response to intravenous calcium are valuable diagnostic points.

Dr. Roscoe Graham has graphically summarized the extra-abdominal lesions which simulate intra-peritoneal disease by grouping them in four areas, *viz.*, (1) in front of the peritoneum; (2) below it; (3) behind it; or (4) above it.

(1) and (2). A routine examination of the abdominal wall itself, and of the scrotal contents will help us to exclude lesions of the first two areas. Hæmorrhage into the rectus abdominis muscle, which has been described by Cullen and Brûlé,<sup>2</sup> and diseases of the testicles are thus quickly excluded.

(3) Behind the peritoneum we have to consider ureteral stone, which may mimic intestinal obstruction because of the colic and the vomiting. However, the site of origin is the flank, the radiation to the scrotum is characteristic, and the urine almost always contains blood.

Pyelitis and pyonephrosis may suggest acute cholecystitis or appendicitis. Again, however, the pain begins in the flank; it radiates downwards; the temperature and leukocytosis are too high, there may be chills, and there is no past history of gall bladder dyspepsia, nor is there any evidence of Murphy's sign.

Still another retro-peritoneal lesion that must be differentiated is tabes dorsalis, a crisis of which may trap the unwary. The systematic examination of the reflexes in every case is a safeguard, although it must be conceded that a tabetic can develop true intra-peritoneal disease.

(4) Above the peritoneal cavity lesions of the lungs and pleuræ must be considered. Pneumonia and pleurisy, especially of the diaphragmatic type, may suggest a lesion in the abdominal cavity. But the mode of onset, the high temperature and leukocytosis, as well as the chest findings on systematic examination, should warn us.

The typical pulse-respiration ratio and the dilating alae naris are important, as is also the fact that there is no true rigidity. Spontaneous pneumothorax is another disease of this class which must be considered.

Coronary disease may give rise to the sudden onset of such an intense pain as to suggest an intra-peritoneal catastrophe. The patient is usually a man of middle age, and often gives a suggestive past history. He has an apprehensive look, is ashy grey or even cyanosed, and is obviously shocked. The pain may be epigastric in location. Examination shows dyspnoea, a thin, rapid pulse and a falling blood pressure. Perhaps there is some cardiac enlargement, and the heart beat shows a muffled, tapping quality. Basal moisture and a pericardial friction may point to the cardio-vascular source of the attack. Fever and leukocytosis do not commonly appear in the first twenty-four hours. Electrocardiographic tracings may show characteristic disturbances, such as notching of the Q, R, S wave, etc. Even if epigastric tenderness is found, there is not a true rigidity associated with it. There may be tenderness along the right costal margin, but it is not restricted to the gall-bladder region. The absence of "board belly" is against the probability of ruptured ulcer; the past history and the repeated emesis of acute pancreatitis are absent; the restlessness and the focal and referred tenderness of acute cholecystitis are not present.

Wechsler<sup>9</sup> has recently described fourteen cases of cerebral disease which showed acute abdominal symptoms, and at least one of which was operated upon for appendicitis. Ochsner and Murray<sup>10</sup> enumerate several other lesions which can simulate acute abdominal disease, and their paper deserves careful reading.

#### CONCLUSION

The enumeration of these lesions, which is by no means complete, indicates the complexity of

the interpretation of acute abdominal pain. Only by a most thorough subjective and objective examination can the source be determined to be extra-abdominal or intra-abdominal, and, in the latter case, whether it is due to obstruction, hæmorrhage or inflammation. Mistakes will occur; but although we may have to admit that we are wrong, we ought never to have to confess that we have not examined.

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#### RÉSUMÉ

La douleur abdominale peut être de provenance intra ou extra-péritonéale. Il faut en savoir les caractères, la localisation, le mode de début et la durée, les irradiations, la représentation anatomique et l'interprétation physiopathologique en regard des signes objectifs observés. La douleur de cause intrapéritonéale a pour causes habituelles la simple colique et l'hémorrhagie; l'obstruction et la torsion; la perforation et l'inflammation. Les douleurs crampiformes rythmées et les vomissements, sans hyperthermie et sans rigidité musculaire signifient colique ou obstruction. Par ailleurs, l'hémorrhagie, la perforation et l'inflammation déclenchent des douleurs toujours très marquées et accompagnées de défense musculaire. La douleur déterminée par une étiologie extrapéritonéale provient d'une maladie constitutionnelle ou d'une lésion siégeant en dehors de la cavité abdominale. Dans ces cas, la défense musculaire fait habituellement défaut. Parmi les causes les plus fréquentes notons les fièvres éruptives, la typhoïde, l'influenza, certaines allergies, l'acidose et le saturnisme. Quant aux lésions de voisinage, il faut éliminer les hémorrhagies des muscles droits et les lésions testiculaires, les calculs urétraux, les affections du rein, les tabès, les affections pleuro-pulmonaires, l'atteinte des vaisseaux coronariens, certaines maladies du cerveau.

JEAN SAUCIER

Leon J. Aries, as a result of experimental studies with synthetic fibre (nylon) as a buried suture, concludes that nylon has all the good qualities of silk and in addition is stronger and less irritating. It may be boiled several times without losing its original tensile strength. He found that a multifilament nylon was flexible, easily

handled, and threaded without difficulty on fine needles. This suture approximated tissues without cutting through, and in fascia and muscle did not cause as much irritation as silk. Experiment on hollow viscera showed the same properties, and the use of nylon in attaching such viscera to the abdominal wall did not result in fistulous tracts.—*Surgery*, 1941. 9: 51.

## SUBTOTAL GASTRECTOMY FOR GASTRO-DUODENAL ULCER\*

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THE purpose of this paper is to show reason why gastric resection appears to be the most satisfactory operation for those cases of gastro-duodenal ulcer in which surgical intervention is advisable. To carry out this purpose it will be necessary to consider briefly the cause of chronicity of ulcers, the indications for surgical intervention, and both the immediate and late results which may be expected when subtotal gastric resection is carried out.

The primary cause of peptic ulcer is generally stated to be unknown. Were it known, it might well be that there would be no place for surgery in the treatment of this condition. Many secondary factors, however, are known. Ulcers usually occur in active, energetic, nervous persons. Duodenal ulcers especially show a definite periodicity until they penetrate adjacent viscera. During the quiescent periods, which last for months or years, the patient is symptom-free. The relief thus obtained is frequently ascribed to some particular diet or regimen. Once symptom-free, however, most patients return to active work, become again involved in nervous stress and strain, eat without discrimination, smoke, drink, and stop taking their pills and powders, and their symptoms return. Anything which increases gastric secretion, such as nervous strain, brain injury or irritation; anything which lessens tissue resistance, such as the toxæmia of massive burns, or ante-mortem changes, tends to produce peptic ulcers. Normally, wounds of the stomach quickly heal. Many acute ulcers quickly heal and the scars of healed ulcers are not infrequently found at autopsy. Operations on acute bleeding ulcers carried out ten days or two weeks after the occurrence of hæmorrhage at times reveal an almost completely healed ulcer. Whether these ulcers arise on ischæmic areas due to embolic infarction or spasm, or are due to erosions resulting from various types of gastritis, or to trauma occurring in stomachs with high acid or low local resistance, we do not know. There are undoubtedly primary causes as yet not clearly understood which originate an

ulcer which then fails to heal. Probably several factors play a part.

Long observation has taught much about the life-history of ulcers. Many subside and recur untreated. Many subside symptomatically when the patient is put at rest on a bland diet with neutralization of the stomach acid. Recurrences are frequent after dietary, especially alcoholic, indiscretions, or during periods of over-work. Peptic ulcers are only seen in those areas of the body which come into contact with the acid secretion of the stomach. The characteristic peptic ulcers seen in Meckel's diverticula are only present when the diverticulum contains islands of gastric mucosa. For some years I have removed every Meckel's diverticulum I have found. None have shown ulcers and in none has histological section shown gastric mucosa. It is recognized, I believe, that these ulcers are due to erosion of the ileal mucosa by secretion from islands of gastric mucosa in the diverticulum.

Marginal ulcers following gastro-enterostomy are very similar. Here typical peptic ulcers are found in the jejunum only after it has been brought into contact with the secretion of the stomach mucosa. Peptic ulcers occur only under these circumstances. In the stomach these ulcers are not usually found in the acid secreting mucosa itself but usually in those portions of the stomach where such cells are only infrequently found, such as the lesser curvature, the cardia, and the pyloric antrum. These cells have evidently less resistance to digestion than the peptic acid cells themselves. It is generally conceded that the cause of the chronicity of peptic ulcer is due to the digestion of the ulcer base by acid pepsin. The acute ulcer appears similar to any other acute localized inflammatory lesion produced by micro-organisms. Ulcers show a wide range both in the severity of symptoms and in types of pathological changes. From the acute case, with rapid healing or rapid perforation and/or hæmorrhage, to the chronic persistent case in which all treatment appears useless, all types are noted.

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Medicine aims to cure ulcers by rest, bland non-stimulating diets, frequent feedings to neutralize the acidity at its height, anti-spasmodic sedatives to lessen the nervous irritability which increases acidity, and alkalis to neutralize the acid. It is noteworthy that the medical approach is palliative as it neutralizes the cause rather than removes it. These methods will cure, at least temporarily, a certain percentage of cases. Periodicity is one of the commonest ulcer characteristics, and it is probable that many cases depend on the natural cycle of ulcer history rather than on the particular treatment instituted. These too frequently recur. However, ulcers which never cause serious symptoms or necessitate frequent loss of work or hospitalization can be carried on under medical care quite satisfactorily. Today it is generally accepted that every ulcer patient should give the physician a fair chance to obtain a cure before submitting to an operation. The regimen prescribed should be adequate, commencing with bed-rest, and including the avoidance of alcohol, tobacco, over-work and nervous strain. With recurrence of symptoms after such treatment, surgical intervention should be considered. It is therefore important that the indications for surgery are clearly understood and accepted by all physicians who are responsible for recommending surgical intervention when the medical treatment has failed. Frequently physicians hesitate to urge operation because they have seen unfortunate results following inadequate or unskilled surgery. It is hoped to show in this article that the mortality can be kept at very low figures, while recurrences should almost never occur. Once surgical intervention is decided upon, it should be strongly urged, otherwise further procrastination occurs. Many patients whose pain and inability to eat have lasted over years, for whom medicine has offered no relief, have been dissuaded from operation by friends and physicians because of poor results they have seen following surgical intervention.

The following indications for surgical intervention are those I have used for ten years and found quite satisfactory.

1. *Absolute indications*: (a) perforation; (b) pyloric stenosis; (c) any possibility of malignancy in gastric ulcer; (d) massive hæmorrhage which does not stop in 24 hours.

2. *Relative indications*: (a) recurrence after adequate treatment; (b) penetration into ad-

jacent viscera; (c) persistent oozing of blood and repeated gross hæmorrhage; (d) recurrence after palliative surgery; (e) all stomach ulcers which fail to respond promptly to medical treatment; (f) geographical, occupational, and economic considerations (patients on relief cannot control adequate dietary precautions; men in mines and lumber camps are too far away as a rule from well equipped hospitals to obtain adequate treatment).

The scope of this article does not allow further elaboration of these indications, but when accepted they save much hesitation and procrastination on the part of the physician who has to decide when to advise operation.

It is obvious that medical treatment demands a great deal of co-operation on the part of the patient, and that once the symptoms subside the desire to live and eat as normal people do usually leads the patient to disregard his physician's advice. Surgery endeavours to bring about this same ideal state whether the patient co-operates or not. A gastro-enterostomy, pyloroplasty, and gastro-duodenostomy tend to empty the stomach more rapidly and to allow regurgitation of alkaline duodenal or jejunal contents into the stomach to neutralize the gastric acidity. These operations unfortunately cure only a certain number, leaving a large percentage of failures, reported up to 40 per cent. The explanation appears to be that the mucosa of the duodenum and jejunum, like that of the mucosa in Meckel's diverticulum, is unable to withstand the digestive action of the gastric secretion, for which it is not by nature prepared. If a gastro-enterostomy functions well the duodenal ulcer will usually heal but a marginal ulcer is apt to occur, in 16 to 20 per cent of cases. This percentage does not appear too high after consideration of many papers dealing with jejunal ulcerations. The reaction against surgery for ulcer which has developed in the last decade is proof enough that palliative operations have been found unsatisfactory.

Subtotal gastric resection does something more. Following this operation not only is the stomach emptied more quickly and alkaline regurgitation of jejunal contents permitted, but the acid-secreting portion of the stomach is removed, that is the fundus. This ideal result is obtained by removing two-thirds to three-quarters of the stomach. Practically the whole of the lesser curvature is excised, while the greater curvature

is removed from the pylorus to the bare area where the anastomosis occurs between the vasa brevia and the gastro-epiploic arteries. It will be noted that the portion of the stomach removed is that portion in which practically all gastric ulcers are found. It is interesting to note further that cancer of the stomach does not appear to occur after subtotal gastric resection. Finsterer informed me that he had never seen, in his large series of resected cases, cancer develop in the stomach stump. This is true of my much smaller series. As cancer of the stomach is one of the commonest sites of cancer in the male, causing almost 2 per cent of all male deaths, this advantage is not to be too lightly dismissed, especially as it further appears that about 10 per cent of gastric ulcers tend to undergo malignant degeneration. Cancer of the stomach which arises on the basis of an ulcer gives very poor 5-year results. It is evident therefore that gastric resection, when the mortality is kept to reasonable figures of 3 or 4 per cent, is a safer procedure for gastric ulcer than either medical treatment or palliative operation, such as gastro-enterostomy.

The criticism that subtotal resection is an unnecessarily radical procedure for a small ulcer is not confirmed by our experience. Ulcers are not truly a local lesion, though they might appear to be such. They are a manifestation of a condition involving the whole stomach, especially as regards its acid-pepsin secretion, and very often accompanied by a diffuse gastritis. To be sure of permanently curing an ulcer the gastric secretion must be radically reduced. This can only be done by removing the fundus or acid-secreting portion of the stomach. The percentage of recurrences following removal of the local lesion alone is very high, and this operation has been abandoned on this account. Theoretically, subtotal resection is not too radical.

Another criticism has been concerned with the high mortality and prolonged convalescence following gastric resection. Such has not been our experience. In a series of 144 cases of subtotal resection for ulcer only four deaths have occurred, a mortality of 2.7 per cent. Among the last consecutive 84 cases no death has occurred. These are not picked cases but include every case which comes to us, such as penetrating ulcers, perforated ulcers, cases with massive hæmorrhage, pyloric stenosis, with ulcers high on the lesser curvature, necessitating almost total

gastrectomy, and with stomal ulcer following gastro-enterostomy which often requires an additional resection of the small bowel.

In only two cases have exceptions been made. One was a man of 74 with a large perforation which was sewn over. The other was a woman who had been on the medical side for some months with marked cardiac decompensation and pyloric stenosis, on whom a posterior gastro-enterostomy was carried out under local anaesthesia. The convalescence following resection is very easy. Most patients are up on the 10th day and go home on the 12th to 14th day. They rarely have any more discomfort than do those cases operated on for appendicitis. It is true that resection is a difficult procedure and should only be performed by surgeons who have had special training in this field. With good hospital facilities and specially trained surgeons the mortality should be well under 5 per cent. When one considers the high mortality occurring in perforations (20 per cent); in malignant degeneration of gastric ulcer (about 10 per cent); deaths from massive hæmorrhage in patients over 45 years (at least 20 per cent), and those who die from inanition with pyloric stenosis or hour-glass stomach, it will be appreciated that the surgical mortality is probably as low or lower than the mortality among those ulcer patients treated persistently by medical means alone.

That marginal ulcers may occur following subtotal resection cannot be denied but the number of these recurrences depends largely on the technique used. In my own series of 144 cases no definitely proved recurrence has occurred. Of these 103 have either replied to a follow-up, or have reported back for re-examination, and among these cases 92, or 90 per cent, are completely free of symptoms after from 6 months to 7 years. A further 7, or approximately 7 per cent, are improved. Two of these have gall stones; one has failed to return for further tests but states he still has some symptoms. A fourth shows no free acid; a gastro-intestinal x-ray series shows a perfectly functioning stoma but her hæmoglobin is down to 72, and she is a nervous, viscerotonic type of woman. A fifth is completely relieved of her old symptoms and ulcer pain, but has a poor appetite and is subject to bilious attacks. A sixth has a low hæmoglobin (82 per cent), no free acid, and a post-operative hernia; he is not gaining weight and

is very nervous. He appears to be hyperthyroidic but we have been unable to get him into hospital for complete investigation. He is able to do his work and does not want to leave it to enter hospital. The seventh has no free acid, no anaemia; the x-ray check-up is negative but he has innumerable vague symptoms not at all similar to his original ulcer symptoms. After a stay in hospital we could find no evidence of any disease.

Of the remaining three patients one died recently, four years after resection from lymphosarcoma. At autopsy his stoma and stomach were found to be free of any recurrence. The second died two years after operation with bilateral Krukenberg's tumours, and later generalized metastases. Following resection she had no free acid; x-rays of the stomach and stoma, and, later, exploratory laparotomy showed no recurrence of her ulcer. This patient probably had a malignant degeneration of her gastric ulcer which was not found after operation by histological section of the ulcer base. The ulcer was of the penetrating variety and so the base was left *in situ*. However, Krukenberg's tumours in the ovary are frequently secondary to carcinoma of the stomach. The third was one who developed tuberculosis one year after his gastrectomy. While in the sanatorium he was readmitted to the Royal Victoria Hospital following hæmatemesis and melæna. Though gastroscopic and x-ray examination revealed no ulcer of the stomach or stoma an alcohol test meal showed a free acid which reached the high level of 80. He has been working for two years; recent check up shows no symptoms whatever.

One of the patients listed among the cures died recently of cerebral hæmorrhage about 12 months after her resection for pyloric stenosis. Up to the time of her death she had had no further gastro-intestinal symptoms.

It will be seen then that though eleven cases could not be put in the cured class, only one of those may have a recurrent ulcer, though even in this case, x-ray and gastroscopic examination failed to reveal its presence, but hæmorrhage and high free acidity makes this diagnosis probable. In two other cases with some residual symptoms re-examination has not been possible.

To recapitulate briefly, it may be stated that out of 144 cases 4 died as a result of operation (2.7 per cent); 3 died later with no recurrence of their ulcer; 92 were completely cured; 39 have either not been located or have too recently

been operated upon (less than 6 months) to be included in this follow-up. Of the remaining 7 cases only one may have a recurrent ulcer. Further, the last consecutive 84 cases have been operated upon with no mortality.

Practically all these patients then live a perfectly normal life, eating as much and as well as any ordinary person. They are on no diet except to avoid hot sauces and pickles. Further, most of them smoke and drink as they desire, though they are warned that this is hardly advisable. It is my contention that if surgery is the solution of this problem it must be such as will allow them to enjoy life like ordinary healthy people without the irritation of constant dieting and other annoying restrictions.

Anæmia has often been referred to as a common result following gastric surgery. Our follow-up statistics do not confirm this. Hæmoglobin estimations were carried out in 53 cases. In 47 the hæmoglobin was above 90 per cent; in 5 between 85 and 90 per cent; and in one case 72 per cent. When anæmia occurs it appears to be of nutritional origin. The resected stomach empties rapidly and food passes early into and rapidly through the small bowel. This is readily confirmed by x-ray. To overcome this patients are advised to start their meals with solid food and to drink as little as possible with their meals. At operation the stoma is made as small as is feasible to ensure good function, in order to retain food in the stomach as long as possible. When the whole end of the stomach is anastomosed to the jejunum, giving a very wide stoma, a greater incidence and greater degree of secondary anæmia is apt to occur. When secondary anæmia does occur iron and extra vitamins will soon overcome it. Pernicious anæmia has not occurred in this series as a post-operative complication.

I feel that an ulcer will never recur if later gastric analyses show no free acid. We have carried out gastric analyses on 30 patients at various times following gastric resection. Twenty-seven of these showed no free acid. One showed a free acid of 25, one of 30, and the other of 80. The latter is the only case in this series in which there is serious suspicion that his ulcer may have recurred. The other is free of symptoms. These results show clearly that subtotal resection, if adequate, will remove the acid, thereby removing the only known cause of chronicity.

In order to have patients completely free of post-operative symptoms a perfectly functioning stoma must result, and the food must pass into the distal loop and not collect in the afferent duodenal loop. When the small bowel is brought in front of the colon, that is, an ante-colic anastomosis, more trouble is bound to occur from this cause. This also gives a greater tendency for the turned-in duodenal stump to blow out, as this frequently results from increased pressure due to retrograde flow. I know that some surgeons of considerable experience recommend an anterior anastomosis of the small bowel to the whole end of the stomach. I am convinced that this procedure gives a higher mortality, a greater tendency to anaemia, more frequent later gastro-intestinal distress, and, perhaps, a higher percentage of recurrences.

There is no space to go into details regarding the technical details of the operation, except perhaps to mention one or two life-saving points. In all our series we have had no persistent failure of the stoma to function and no leak or serious bleeding from our anastomosis, that is in 144 cases. Bleeding is controlled by using a running locked suture posteriorly, and a base-ball suture anteriorly. Leakage of the "fatal" angle, which is at the junction of the anastomosis with the closed portion of the lesser curvature half of the stomach stump, is prevented by means of two pursestring sutures hitching up the afferent end of the duodenum to the stomach. This also completely prevents retrograde flow.

Competency of the stoma is assured by seeing at the completion of the anastomosis that the stoma is open and admits two fingers, and that there can be no twisting of the small bowel to interfere with the lumen. With the no-loop posterior anastomosis the stomach is fixed at the oesophagus and the afferent end of the stomach-jejunal anastomosis at Treitz' ligament. Thus no movement or twisting of the stoma can occur. If vomiting occurs it is due to inflammatory oedema and will subside in from a few days to three weeks if the blood proteins are kept at normal level by blood transfusions or by concentrated plasma given intravenously. Avitaminosis is probably also a factor in the persistence of this oedema, and vitamin C should be prescribed. As two of our four deaths occurred from leaking of the duodenal stump, this stump must be closed very carefully and buried under the adjacent peritoneum. If leakage then occurs it will tend to form a localized, rather than a

generalized peritonitis and the patient will more likely be saved. We have had one such case.

Shock is lessened by scrupulously gentle handling of tissue, the use of fine silk sutures, and safeguarding the blood supply of the omentum by ligating the branches of the gastro-epiploic vessels running to the stomach separately. Fatal pneumonia is avoided by the use of spinal anaesthesia, and the use of the rebreathing bag for a few days after operation. Free lung ventilation avoids or relieves atelectasis and thereby prevents it, as a rule, from progressing into a true and serious post-operative pneumonia.

Efforts are made to prevent pulmonary embolism by frequent movements in bed and not putting the patient in a high Fowler position. A high Fowler's position interferes with circulation at the sapheno-femoral junction which is the usual site of the phlebitis from which the embolus comes. Dr. Luke and I have operated on four cases of phlebitis, two of which had pulmonary emboli, and in each case a clot was found in the left femoral vein at the junction of the saphenous. All these cases recovered. It is my opinion that to keep the mortality of subtotal resection at 2 or 3 per cent every safeguard must be thoroughly studied and consistently used. Team work at operation and after operation is essential.

The post-operative regimen is very simple. Nothing is given by mouth for the first 24 hours. One ounce of water every hour is given during the second 24 hours; five ounces of milk and water every hour during the third 24 hours; after that a gradual increase daily until on the eleventh to twelfth day the patient receives a full meal, including a steak. At the slightest sign of distension or discomfort the nasal catheter is passed and the stomach deflated; 2,000 c.c. of 5 per cent glucose in normal saline are given intravenously daily until the patient is taking sufficient fluid by mouth. The patient gets up on the 10th to 12th day as a rule, and is home on the 12th to 14th day. The post-operative course is quite as comfortable as that following a simple appendectomy or herniotomy, and post-operative shock should never be seen.

Where patients have been bleeding or half starved through pyloric stenosis or an inadequate diet, every effort is made to bring them into good shape by transfusion, or adequate feeding with adequate diet. We believe wound eruption is due to vitamin C deficiency, and as one of our deaths occurred from intestinal ob-



struction due a month previously to wound eruption we watch the vitamin intake with care.

These results, in my opinion, show that subtotal resection is a safe operation with a very low mortality, the highest possible percentage of cures being well over 90.

There are no later complications which need serious consideration, though iron therapy will prevent any tendency to secondary anæmia. In order to gain weight more food than usual should be advised. This is obtained by giving small extra meals between the ordinary meals, though,

as a rule, this is unnecessary. It is my firm conclusion, based on this comparatively large series of subtotal resections, that this operation is the operation of choice for all cases of gastroduodenal ulcer, and that the mortality of this operation should be less than among those patients treated by medical means alone. Economically, this is the cheapest way to treat ulcer patients, as they are in the hospital for only two weeks, and can go back to their work a month later without any further expense for ulcer treatment as long as they live.

## THE RÔLE OF THE CORPUS LUTEUM IN THE TOXÆMIA OF PREGNANCY

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IT is proposed in this paper to put forward the hypothesis that the toxæmia of pregnancy is caused by an uncompensated endocrine imbalance due to excess secretion of progesterone by the corpus luteum and the placenta. This hypothesis offers the possibility of unifying all forms of toxæmia into one broad group with a common etiological basis, without explaining away the varied clinical manifestations. It deals with the rôle of the corpus luteum, which has been referred to as the master-gland of pregnancy. Its secretion is called progesterone. The production of this hormone begins immediately after the rupture of the follicle and anticipates the onset of pregnancy.

Fraenkel<sup>1</sup> has shown that the presence of a functioning corpus luteum is essential not only for the embedding of a fertilized ovum but also for its maintenance and development in the uterus. Destruction or removal of the corpus luteum in early pregnancy inevitably leads to abortion. When embedding has taken place the corpus luteum continues to function as the corpus luteum of pregnancy instead of degenerating as it does at the end of a cycle. This pregnancy activity is due to a stimulus received from the embedding ovum whose trophoblast cells open up the maternal blood spaces and liberate into the mother's circulation a chorionic luteinizing hormone. As a result of this the corpus luteum continues to secrete more and more progesterone, which by its action upon the decidua in the uterus provides the medium in which the embryo can develop. Moreover,

Knaus<sup>2</sup> has shown that in rabbits, and probably also in human beings, progesterone relaxes the smooth muscle and inhibits the spontaneous rhythmical contractions of the uterus and counteracts the normal response to pituitrin. Ordinarily, any foreign body in the uterus stimulates contractions. Not so however in pregnancy, for, due to the relaxation caused by the progesterone, the uterus grows in spite of the foreign body. The uterus is soft and relaxed, thus accounting for Hegar's sign early in pregnancy.

It is interesting to note that progesterone relaxation is not limited to the uterine musculature but extends its influence to all unstriated muscle. The smooth muscle of the bowel is affected. Hence the constipation of pregnancy.

The unstriated muscle of the ureters is similarly affected. In all normal pregnancies routine radiographic evidence indicates that the ureters become dilated, elongated and tortuous. These changes occur without any signs of obstruction.

From observations by Traut<sup>3</sup> and Baird<sup>4</sup> it has been learned that the tone of the ureter varies simultaneously with that of the uterus, due evidently to the same endocrine influence. These authors found that mild or moderate pressure alone upon a ureter is insufficient to cause dilatation. On the contrary, a moderate rise of pressure in the ureter merely stimulates a stronger and faster peristalsis. In gynaecological cases, where the ureter may be compressed just as much as by a pregnant uterus, dilatation is much less common. At no time is the direct pressure exerted by the pregnant uterus great



than that of the intestinal weight-mass. The tortuosity and dilatation do, of course, predispose to stasis of the urinary flow, and if any infection enters the peri-ureteric lymphatic channels from below it may quickly travel up to produce a pyelitis. The pyelitis is not therefore the primary cause of the dilatation, but it may accentuate it. It has been observed that infections flare up most frequently during the middle trimester when the ureter is most atonic.

The bladder and its sphincter contain smooth muscle which may be also similarly affected. Consequently, there may be some frequency and loss of control of urination. Some maintain that these symptoms are due to intra-abdominal pressure, but, *per contra*, large fibroids do not cause them. The frequency is therefore doubtless due to the pressure of the soft uterus upon the toneless bladder and sphincter.

In the cardiovascular system progesterone also produces relaxation of smooth muscle. The heart, aorta, arteries and capillaries, all undergo dilatation and enlargement. The heart is enlarged proportionally with the increase in body weight. Its output begins to rise in the fourth month and may increase 50 per cent at term. Haemic murmurs may accompany the enlargement. The heart returns to normal three weeks after delivery (Slander).

As a result of the dilated cardiovascular system a larger blood volume is required to fill the system, so there is increased water retention. This leads to a state of temporary hydræmia. As a consequence a relative secondary anaemia is produced, an almost constant finding in pregnancy. The red blood cells and hæmoglobin usually show approximately a 25 per cent fall, while the white cells increase relatively due to the stress put upon the system. Hydræmic blood shows a fall in osmotic pressure relative to that in the tissues. Therefore increased fluid retention occurs in the tissues producing a degree of generalized oedema. Oedema, then, forms the ground work for the development of toxæmic disorders. The degree of oedema is indicated by the gain of weight in pregnancy. It is well known that too great a gain in weight is a sign of advancing toxæmia, and this is usually accompanied or followed by a rise in blood pressure. Many women gain from 30 to 50 lbs. weight during pregnancy. Only a small part of this is due to growth of the fetus however. Most of it is attributable to fluid retention, and this part is

quickly lost during the first few days post partum.

As the blood volume is increased, and as the smooth muscle of the capillaries is also relaxed, the capillaries receive a larger volume of blood. Therefore all organs become more vascular, especially those possessing large capillary surfaces, viz., the liver, kidneys and uterus. The blue discoloration of the vaginal mucosa, the so-called "Chadwick's sign", is a result of dilated capillaries. Further evidence of increased capillary vascularity is found in capillary oozing observed when operations are performed during pregnancy.

There is no doubt that during pregnancy in a normal subject blood pressures are lower than in the non-pregnant state. This, it is thought, may be due to the general state of hypotonicity of the vascular system. Low blood pressure is frequently found in association with morning sickness. It is also commonly associated with the pyelitis of pregnancy. I have observed that following the use of sulfanilamide on these patients, cure of the sepsis, which previously had acted as a stimulus to the cardiovascular system, causes the patient at times to appear so weak as to be frequently on the verge of collapse.

The veins also carry an increased volume of blood. All this is made clinically apparent by the varicosities of the dependent parts of the body. These are not the result of pressure or the increased intra-abdominal tension or obstruction. As mentioned previously, the weight-mass of the pregnant uterus is not greater than that of the intestines. Ovarian tumours as large as a pregnant uterus do not ordinarily produce varicosities, and these usually shrink following the death of the fetus, although the uterus be not emptied.

An important element associated with this generalized state of smooth muscle hypotonicity in pregnancy is the control of the blood pressure. This depends upon (1) the efficiency of the vasomotor centre, and (2) the constitution of the vessel wall. In the non-pregnant state, the vasomotor centre when stimulated causes contraction with a rapid response, causing the pressure to vary to meet changing conditions, as, for example, when a person suddenly assumes the erect posture. In pregnancy, however, a sudden rise from sitting posture may produce a transient feeling of faintness or actual syncope, because the control over the blood pressure is less

efficient. The stimulus travelling to the vasomotor centre may be equally strong, but the stimulated vessel is relatively flabby and atonic and the response is correspondingly weak. This may also produce nausea or vomiting (morning sickness). The Bainbridge reflex is nature's attempt to overcome the cerebral anaemia. In this condition the blood tends to be drawn back into the right heart, causing a deep breath to be taken with the glottis closed. The abdominal muscles as they contract squeeze the splanchnic vessels and at the same time produce compression of the stomach, causing vomiting.

In addition to the toxic factor associated with oedema other factors exert an important influence in hyperemesis, *e.g.*, neurotic, reflex, and allergic.

We have dealt with the physiological changes in pregnancy occurring as a result of hormonal activity emanating from the corpus luteum. This gland may over-function or under-function in the production of progesterone. When it functions abnormally, then, normal physiology suffers correspondingly. If, on the one hand, the corpus luteum functions insufficiently there are inadequate uterine relaxation and excessive uterine irritability, so that the normal rhythmic contractions are accentuated, and if the placenta is not firmly attached abortion may occur. This is usually during the early months of pregnancy. I have observed, however, that the patient who suffers from a threatened abortion does not suffer from morning sickness. Conversely, the patient suffering from severe morning sickness will rarely abort spontaneously. If on the other hand, the corpus luteum over-functions, the oedematous, plethoric, secondarily anaemic pregnant female becomes a pathological case exhibiting the signs of some form of the toxæmia of pregnancy, the clinical manifestations of which will depend (1) upon the stage of pregnancy when the hyper-secretion occurs, (2) upon the degree of gland hyperfunction, and (3) upon the organ most susceptible in that individual to the changed metabolism.

It has been stated that some mild generalized oedema may be considered physiological. The essential picture in toxæmia is an excessive degree of general oedema and a still more pronounced degree in the organs which have a large blood supply. So the greater the blood supply, the greater the tissue oedema. The most vascular internal organs are the liver and kidneys, so

they are the ones most often markedly affected in toxæmia.

Oedema causes swelling and separation of the cells. These fail to get their proper nourishment from the blood owing to the surrounding oedema and to the watery, anaemic character of the blood. If this condition persists, or if it is accentuated beyond a mild degree, the cells most distant from the capillary vessels will show signs of degeneration, in the form of cloudy swelling, hydropic and fatty degeneration. In the more serious cases coagulation necrosis usually follows. The capillary vessels may then dilate to the degree that the endothelium ruptures, producing terminal hæmorrhages in the tissues.

This mechanism describes the essential structural pathological changes occurring in toxæmia, whether the organ chiefly involved be the liver, kidney or uterus. Toxæmia appears to be a systemic condition, and all organs are affected to a greater or lesser degree, but as the liver and kidneys have the greatest capillary surface areas these show the greatest involvement; if early in pregnancy, this will manifest itself as hyperemesis; if late, as pre-eclampsia or eclampsia. Other cases will show predominating signs of renal insufficiency, *viz.*, marked hypertension and retention of nitrogenous products.

If toxæmia in the last months of pregnancy is sufficiently profound to produce a critical state, either pre-eclampsia, acute renal deficiency, or accidental hæmorrhage will develop, depending upon whether the liver, the kidneys, or the uterus, respectively, break down first. If it affects the uterus degeneration and, later, hæmorrhage occur in the uterine muscle. As the muscle dies the placenta tends to separate, thereby producing retroplacental hæmorrhage. In fatal cases, whether death be due either to concealed hæmorrhage, eclampsia or hyperemesis, the liver at post-mortem will show in all cases the same necrosis and hæmorrhage. When the case is of the renal type, oedema, degeneration, necrosis and hæmorrhage occur. The vascular congestion swells the glomerulus to fill Bowman's capsule. The capillary endothelium thins to the degree that protein leaks through, thereby giving rise to albuminuria. A rise in blood pressure usually precedes albuminuria by three or four weeks. This is produced by a rise in blood volume. Fluid infiltration of the tissues will also be maximal, and as the vessels cannot hold more the blood pressure tends to rise correspondingly.

Normally, the tubule cells of the kidney excrete urea, uric acid, etc. In the toxic state there is no accumulation of these products in the blood until the tubule cells are affected. In cases of cortical necrosis the circulation is impaired, the tubules swell profoundly, degenerate and die, and anuria and death ensue.

An important function of the liver is the detoxification of the blood carried to it by the portal vein. Proteins are broken up by the process of deamination in the liver, but if the proteins are injected directly into the blood stream anaphylaxis occurs. So when the liver function is deranged the proteins are not broken down and pass into the general circulation. In a dog the portal vein was transplanted into the vena cava so as to short-circuit the liver. So long as protein was withheld the dog carried along satisfactorily, but when proteins were given the animal developed convulsions and died in a condition resembling eclampsia.

William and Wallis state that the presence of an excess of cholesterol in the blood in pregnancy is very significant, because it develops at a time when the corpus luteum is most active. In eclampsia the hypercholesterolemia is very marked, and it has been shown that injections of corpus luteum extract increase the cholesterol content of the blood. They consider the hypercholesterolemia an attempt to neutralize the toxic lutein substance. They experimented on rabbits with fresh extract of pig and human corpora lutea, free from cholesterol, choline, histamine, tyrosine or protein, and found that this extract injected into animals produced lesions similar to those found in the kidneys of women dying of eclampsia. The authors therefore concluded that the corpus luteum contains a chemical compound which can produce lesions in animals similar to those encountered in eclampsia, and that an over-production of this substance might be the cause of eclampsia.

The question naturally arises—"How can the corpus luteum be responsible for a late toxæmia of pregnancy, when, as is generally believed, the gland ceases to function as a governing element in pregnancy during the second trimester?"

Although the corpus luteum is undoubtedly necessary for early pregnancy, it has been known for years that in the human and certain other species it can be removed in the late months of pregnancy without disturbing the course of that pregnancy. This at first was

interpreted as proof that the corpus luteum hormone plays little or no rôle late in pregnancy. At any rate it seemed evident that after a certain stage of development the embryo becomes independent of its former protector, the corpus luteum, and that there is evidence to suggest that this independence in point of time varies considerably from the second month in some cases to as late as the fourth or fifth in others. The discovery by Adler, DeFremercy and Tausk<sup>5</sup> and others that the placenta at term contains progesterone led Browne and Venning<sup>6</sup> to suggest that this independence is due to the general transference of the secretion of progesterone from the corpus luteum to the placenta in the latter part of the first or early in the second trimester of pregnancy. At this period the placenta has already approached its maturity. It has been shown also that a progesterone content was found in a full-term placenta of a patient who had had both ovaries removed on the 135th day of her pregnancy.

In 1936 Venning and Browne<sup>7</sup> isolated sodium pregnandiol glucuronide, and demonstrated that this substance is a derivative of progesterone. Later Venning<sup>8</sup> devised a method of estimating its production quantitatively. It then became possible for the first time to determine the quantitative production of any source of progesterone in the human body during the normal cycle and in normal pregnancy. These studies indicate that pregnandiol production rises from between the second to the fifth month and reaches a maximum about the seventh or eighth month. Within twenty-four hours after labour however pregnandiol disappears completely from the urine. This evidence strongly suggests that the placenta takes over the function of the corpus luteum.

In toxæmia of pregnancy the excretion of pregnandiol frequently falls below the normal level, and in some severe cases of pre-eclampsia, Weil<sup>9</sup> found that it was entirely absent.

According to the observations of Hamblen, Ashley and Baptist<sup>10</sup> four factors are concerned in the metabolism of progesterone, and in the excretion of its derivative sodium pregnandiol glucuronide: (a) an ovarian factor involving the production of progesterone by corpora lutea and from the luteinization of follicles; (b) an endometrial factor concerned with the breaking down of progesterone into pregnandiol; (c) an hepatic factor which brings about the com-

pounding of pregnandiol with glucuronic acid; and, lastly, (d) a renal factor involving the excretion of sodium pregnandiol glucuronide.

The absence of pregnandiol from the urine, when normally it should be present, indicates the functional failure of one or more of these factors. In toxæmia, therefore, where there is impaired liver and kidney function, it is understandable that the pregnandiol level of the urine would fall. Probably a vicious circle is established wherein the liver, which ordinarily breaks down the progesterone so that it can be excreted, bears the brunt of the injury produced by the excess of secretion, and predisposes to an accumulation of hormone-poison.

I have noted that in a severely toxic pre-eclamptic case following the death of the fetus, the signs of toxæmia, the generalized state of puffiness and œdema, and the elevated blood pressure, appear to vanish like magic, although the fetus is still *in utero*. Therefore it is obvious that the causative hormone is very rapidly removed from the system, once its production stops. An exception to this rule would be the case in which the kidneys were extensively involved and some permanent damage was produced, or in the case in which chronic nephritis impairs elimination. Under such circumstances one would not expect to find immediate improvement owing to the renal insufficiency.

Why there should be hypersecretion of progesterone in some cases and not in others it is difficult to fathom, but I believe that the problem is intimately linked up with the activity of the trophoblast. Possibly the source of the overstimulation is primarily in the trophoblast. This suggestion is supported by a study of the systemic effects of hydatidiform moles, as will be shown presently. The trophoblast is the most malignant-like normal cell in the body. Owing to its invasive properties it can be easily disseminated throughout the body and cause death. In the endometrium a decidual reaction is called forth to limit any excessive activity, by a process of decidual phagocytosis. If the protective decidual reaction is not adequate the chances of over-activity are greatly enhanced. The extreme of this condition is seen in chorion-epithelioma. In multiple pregnancy there is a greater amount of trophoblastic activity and it is well known that toxæmia is more frequent and more severe in these cases. It is thought that in cases of hydatidiform mole the trophoblast is present in excess and is hyperactive.

retaining synektial powers of invading the wall of the uterus and especially the maternal vessels. In such cases hyperemesis is frequently present and may be severe. In such cases also pre-eclamptic toxæmia is more frequent than in normal pregnancy. Indeed its development early in pregnancy should arouse suspicion of a mole. All the signs of severe toxæmia may occur, albuminuria, œdema and elevated blood pressure. Even eclampsia may supervene, occasionally even as early as the fifth month.

The uterus is soft and very atonic, in keeping with our hypothesis, exhibiting a characteristic doughy consistence. Bilateral multiple lutein cysts of the ovary are always present and these are frequently large enough to be detected clinically by vaginal examination. These luteal cysts occur similarly in chorionepithelioma which may follow the mole. The picture found here of a hyperactive trophoblast, coupled with hyperactive corpora lutea, which in the absence of any fetus produce all the signs, symptoms and pathological disturbances of the different forms of pregnancy toxæmia is indeed strong evidence of the truth of our hypothesis.

From the facts, observations and assumptions presented, then, it is possible to explain eclampsia, pre-eclampsia, hyperemesis gravidarum, accidental hæmorrhage, and the various minor disturbances, on a common etiological and pathological basis. We might therefore suggest that there is only one toxæmia of pregnancy with varied clinical manifestations; that this toxæmia is essentially an uncompensated endocrine imbalance associated with hyperactivity of the corpus luteum and the trophoblast.

Toxæmia may be mild or severe, depending upon the degree of the hypersecretion. The time of its manifestation will depend upon the appearance of the imbalance. Some cases will be on the borderline between the physiological and pathological states. Thus mild nausea would probably be physiological early in pregnancy, whereas repeated vomiting would shade over into the pathological field.

Since toxæmia is an endocrine problem, and since normally a co-operative balance is maintained between the various glands of internal secretion, so when the corpus luteum secretion creates an imbalance the other glands will be proportionately affected. This consequent general imbalance is more readily produced during pregnancy owing to the limitation which pregnancy imparts to secretory glands in general.

The relationship between the corpus luteum and the trophoblast is of interest. It is possible that the stimulus to hypersecretory activity of the corpus luteum originates in the trophoblast. As yet this cannot be proved, but it is probable that there is some such relationship from the evidence produced by the cases of hydatidiform moles.

Renal disease, or chronic nephritis complicating pregnancy, is not a true toxæmia of pregnancy, although its signs and symptoms so often simulate those of toxæmia. From the standpoint of treatment it is of course essential to establish an accurate differential diagnosis. So also in hypertensive arterial disease we are not dealing with a toxæmia, for in these cases the patient is suffering from a condition of "essential hypertension" which probably was present before pregnancy.

While it is not the express purpose of this paper to deal with the treatment of toxæmia, mention of vitamin B<sub>1</sub> as a possible antagonist for the progesterone excess may be in order. From recent work, as yet unpublished, J. R. Goodall has found vitamin B<sub>1</sub> an efficient agent not only in overcoming primary uterine inertia, a frequent complication of toxæmia, but also in toning up the relaxed smooth muscle of the post-partum bladder and urethra. Moreover, he has had striking success in its effect on hyperemesis. I have found personally, with recent preliminary trial, that certain cases of pre-eclampsia, observed on the wards of the Royal Victoria Hospital, Maternity Pavilion, respond with rapid fall in blood pressure and decrease in albuminuria, when vitamin B<sub>1</sub> is given in daily oral doses of 4,500 units. Further, Bickel<sup>12</sup> has found that cardiovascular

disturbances arising in pregnancy toxæmia respond well to parenteral administration of vitamin B<sub>1</sub>.

### CONCLUSION

A possible explanation of the etiology of toxæmia of pregnancy has been presented. This condition is considered to be due to a disturbed endocrine balance, with the master gland of pregnancy, the corpus luteum, and the trophoblast of the placenta playing the major rôles. Hypersecretion of these elements in toxæmia produce an uncompensated endocrine imbalance and this has been advanced as the basic cause of excessive relaxation of all smooth muscle of the body (uterus, vascular system, bowel, ureters, etc.), which in turn lead to œdema and other changes in organs of great vascularity, such as the liver, kidneys, uterus and brain.

Vitamin B<sub>1</sub> is a possible antagonist to excess progesterone, in many cases beneficially influencing the endocrine imbalance.

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THE DOCTOR'S HANDBAG.—Dr. Morris Fishbein, editor of the *Journal of the American Medical Association* has said that 85 per cent of human diseases are of the type that the general practitioner can handle with the amount of equipment that he can carry in his handbag. Now, Dr. Hugh Cabot in his book "The Patient's Dilemma", comments that "this statement never was true and it is less true today than it ever was". In order to find out which of these views was correct, five doctors of Winslow-Salem tabulated an average of 200 consecutive patients each making 1,000 in all. Of the 1,000 patients, \$48 or 84.8 per cent had been cured for without any other equipment than the contents of a handbag. A modern doctor's bag contains at least a blood pressure apparatus,

a stethoscope, a hypodermic syringe, an otoscope, an ophthalmoscope, a trans-illumination light, scalpels and gauze, a blood counting apparatus, glass slides, a pleximeter, tongue depressors, a hemoglobin scale, Wassermann tubes, culture tubes and a few other odds and ends. The lowest proportion of patients cared for unaided by an individual doctor in the investigation referred to was 82 per cent, the highest 89 per cent. The average of 84.8 per cent is close enough to 85 per cent to allow Dr. Fishbein to win out. It must be remembered that the remaining small margin of 15 per cent which the contents of the doctor's handbag will not take care of, include cases of arthritis beyond cure, mental cases, and those with chronically poor health that no scientific medical attention will cure.

J.W.S.Mc.

## RECOGNITION AND TREATMENT OF ADDISON'S DISEASE\*

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INVESTIGATIONS in the past ten years have resulted in the elucidation of the physiological changes which occur in a patient suffering from Addison's disease, have made available effective therapeutic measures, suggested new diagnostic procedures, and cast light on other clinical conditions. These results have come largely from the laboratory, where the technical progress of the last half century has nurtured scientific progress. Man's powers of observation have not progressed to a corresponding degree, so little has been added to Addison's<sup>1</sup> masterly description couched in the following words: "The leading and characteristic features of the morbid state to which I would direct attention are anaemia, general languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change of colour in the skin, occurring in connection with a diseased condition of the 'supra-renal capsules'."

The onset of this malady is generally gradual, the feeling of weakness or fatigue commonly preceding pigmentation. Occasionally, pigmentation, weakness, and gastrointestinal symptoms of nausea and vomiting come on together. In rare cases the process is acute and may follow trauma or infection.

## CLINICAL RECOGNITION

The asthenia seen in this disease is not diagnostic, as it is commonly met in other conditions. Hypotension, when present, falls in a similar category, but it should be noted that patients suffering from Addison's disease may have pressures quite within the normal range during the remissions which characterize the course of this disease. Gastrointestinal upsets obviously are not pathognomonic. However, the coexistence of these three features of the disease may direct attention towards the adrenals.

The presence of characteristic pigmentation adds assurance to the diagnosis. When marked,

as it is in the majority of cases, it can be seen on the mucous membranes as well as on the skin, where it is accentuated over knuckles, knees, elbows, pressure points and scars. Multiple black freckle spots also appear. When pigmentation is not very intense it is difficult to distinguish from the discoloration seen in debilitated persons suffering from a variety of conditions, racial pigmentation, or sun-tan. The pigmented appearance presented by patients suffering from arsenical dermatitis or from idiopathic steatorrhoea may offer confusion. Only rare cases of Addison's disease are entirely lacking in increased pigmentation.

The case presenting little or no pigmentation is most difficult to diagnose, and in such instances laboratory investigations prove of special value. There is one circumstance, however, in which these people may be recognized clinically as suffering from Addison's disease, that is, during the development of cardiovascular collapse associated with an increase in nausea, vomiting and weakness. Such a state, which is termed "crisis", punctuates the course of most cases of Addison's disease. The systolic blood pressure falls below 70 mm. Hg., the pulse is usually slow and of extraordinarily small volume. No cause of the collapse is apparent, but it is most frequently associated with marked dehydration. Rational therapy in "crisis" is with intravenous saline and glucose which may restore the patient quickly, though when treatment is stopped there may be a subsequent similar decline. Such a clinical course suggests adrenal insufficiency.

A finding of some interest, associated with evidence of cardiovascular weakness in Addison's disease, is the size of the heart. The organ is small to percussion, an observation confirmed by fluoroscopy and at autopsy. Instead of the normal cardiothoracic ratio of about 50 per cent, the size of the heart in several of our cases has been below 40 per cent.

Another clinical feature not infrequently encountered is defective distribution of secondary hair. This, I believe, is more often noticeable in those cases due to atrophy of the cortex rather than in those where the gland is destroyed by

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tuberculosis. It is a point which may be of value in assessing which of these two pathological processes is affecting the adrenals.

Hypothyroidism is met in association with Addison's disease probably more commonly than has been appreciated heretofore. We have observed it in four cases. In two of these it was clearly distinguished on clinical grounds. In the other two the exceptionally low basal metabolic rate suggested the therapeutic trial of thyroid extract which proved effective. In the hypometabolism of non-thyroid etiology that is often seen in Addison's disease thyroid therapy is ineffective and dangerous.

#### PHYSIOLOGICAL DISTURBANCES IN ADDISON'S DISEASE

Outstanding among physiological disturbances in both animals and human beings suffering from adrenal cortical insufficiency are those related to salt and water metabolism. Plasma or serum sodium and chloride values are almost constantly low, potassium high. These changes, as Loeb<sup>2</sup> and Harrop and his colleagues<sup>3</sup> have shown, are due, largely at least, to a change in renal function, sodium chloride being excreted and potassium retained.

Excessive loss of water by way of the kidney is associated with the excretion of sodium chloride. These changes lead to a reduction in both plasma volume and interstitial fluid. The water loss apparently is the important feature, as restriction of water intake alone may precipitate a crisis<sup>4</sup> just as readily as restriction of salt intake.<sup>5</sup>

The importance of the potassium increase in the blood in experimental adrenal insufficiency has been stressed by Zwemer and Truszkowski<sup>6</sup> and by Allers, Nilson and Kendall.<sup>7</sup> Consumption of large amounts of potassium salts is dangerous for patients suffering from Addison's disease, as has been shown by Wilder and his associates.<sup>8</sup> This is due in part to the augmenting effect potassium has on the excretion of the sodium ion by the kidney. Accumulation of potassium in the blood and tissues, though intimately associated with the occurrence of crises, does not appear to be the cause, since crises do occur in the absence of such an increase.

Retention of nitrogen, as well as potassium, is sometimes seen and is a manifestation of the deranged kidney function. In contrast to this, the blood sugar is commonly found to be low in cases of Addison's disease. This is dependent

on a factor in adrenal cortical function independent of the salt and water disturbances.

Chemical research in the past few years has resulted in the isolation of a score of pure chemical substances from the adrenal cortex.<sup>9</sup> These have a sterol nucleus like the sex hormones, and some actually have male and female sex hormone properties. However, the two most important seem to be desoxycorticosterone, which has a marked action on salt and water metabolism, and corticosterone, which has a more potent effect on carbohydrate metabolism. These two closely related substances can be taken as typical of the main actions of adrenal cortical extracts. Unfortunately, only the former has been prepared in sufficient quantity for clinical trial. It can be synthesized from stigmasterol obtained from the soya bean.

#### DIAGNOSTIC LABORATORY PROCEDURES

Among laboratory procedures of value in making a diagnosis of Addison's disease, Loeb<sup>2</sup> has shown that determination of serum sodium is important. There are few conditions other than this in which levels below 300 mg. per cent occur. We have found very low values in severely undernourished individuals, one being a case of anorexia nervosa and another a case of idiopathic steatorrhœa. Normal values of 315 to 330 mg. per cent are not inconsistent with the presence of Addison's disease, so that only a really low serum sodium level is of aid in diagnosis. Serum potassium estimations may be elevated in this condition but the technical difficulty of the laboratory procedure greatly reduces its utility.

#### CLINICAL TESTS

1. *Salt deprivation.*—Putting a suspected case of Addison's disease on a low sodium chloride intake for a few days was introduced by Harrop *et al.*<sup>3</sup> in 1933 as a method of determining the presence or absence of this condition. The appearance of symptoms of crisis and the production of lowered blood sodium and chloride levels indicate a positive result. The procedure may take some time and is dangerous; at least one death resulting from this test has been reported.

2. *Potassium tolerance.*—The greater rise and delayed fall in plasma potassium levels following ingestion of several grams of potassium in cases of Addison's disease was suggested by Zwemer and Truszkowski<sup>6</sup> as a diagnostic test. The usefulness of this test is restricted by the necessity



for potassium determinations which, as mentioned above, involve certain technical difficulties. The procedure has been adversely criticized by Gordon, Sevringhaus and Stark.<sup>10</sup>

3. *Chloride excretion test.*—This test, described by Cutler, Power and Wilder,<sup>11</sup> was suggested by the observation that chlorides in high concentration are excreted in the urine in Addison's disease despite a low blood chloride value. Briefly, the test is conducted as follows. The patient is placed on a diet containing 1.5 grams of sodium chloride and 4.0 grams of potassium; additional potassium is given on the first and second days of the test. The chloride concentration in the urine is estimated on the third day, and, when Addison's disease is present, a concentration above 200 mg. per cent is shown, whereas controls, including nondescript asthenia cases, rarely exceed a value of 100 mg. per cent.

4. *Therapeutic test with cortin.*—This test is not recommended, as many patients lose their neurotic symptoms following cortin injections, and nothing is proved.

5. *Tests for tuberculosis.*—The tuberculin test is of aid in determining whether a particular case is due to tuberculous infection or to atrophy which has a better prognosis. X-ray examination of the adrenal region in cases where a tuberculous process has destroyed the adrenals may disclose typical shadows due to calcification of the gland. The absence of calcification, however, does not exclude the possibility of tuberculous destruction of the adrenals.

#### TREATMENT

Therapy in Addison's disease, as Loeb<sup>12</sup> has so succinctly emphasized, should be directed towards: (1) remedying the salt and water deficiency; (2) substitution for the hormonal lack; (3) protection of the patient against agents which may aggravate the condition. The degree of emphasis to be placed on these three factors depends on the clinical condition of the patient. Because of the emergency nature of the crises that occur in the course of this malady let us first consider that aspect in its various manifestations.

#### THE PATIENT IN CRISIS

(a) *Simple adrenal insufficiency.*—Such a patient probably has been declining for some days or weeks and is profoundly weak and dehydrated. There are few emergencies in medical practice which demand such prompt and vigorous treat-

ment. The blood pressure may be so low as to be unobtainable, the pulse of extraordinary weakness and small volume but markedly slow in contrast to other conditions in which cardiovascular collapse is so apparent. The patient may be comatose, but even if conscious time should not be wasted in elaborate questioning and exhaustive examination. While the necessary preparations for intravenous therapy are being made, sufficient history can be obtained from relatives and the important details of the patient's physical condition observed—pulse, blood pressure, temperature and degree of dehydration.

It is important that immediate steps should be taken to replenish the reduced amount of circulating fluid and to administer glucose and cortical hormone. In order to start intravenous therapy it is frequently necessary to cut down on a vein as in crisis these vessels often are so collapsed and contracted as to make venepuncture difficult if not impossible. While the needle is in the vein enough blood should be withdrawn for the determination of sugar, non-protein nitrogen, packed cell volume, and of sodium, chloride and potassium if desired. Time should not be taken to obtain results of the blood analyses as the immediate treatment is the same, no matter what these may be. They will, however, be of value later in determining the progress of the patient.

The composition of the intravenous solution to be administered should be as follows: normal saline, 900 c.c.; 6 per cent saline, 700 c.c.; 50 per cent glucose, 400 c.c. The final concentration of the different ingredients is approximately 2.5 per cent saline and 10 per cent glucose. The first half litre of this fluid should be run in fairly rapidly in the course of one-half hour. After that it should be given more slowly so that the patient gets another 1,000 to 1,500 c.c. in the next eighteen hours. No more than 2,500 to 3,000 c.c. should be given in the first twenty-four hours as it is possible to give too much fluid.

Adrenal cortical extract is an important adjunct to the above therapy and should be given at the outset, 20 to 30 c.c. being run in with the saline in the first fifteen minutes. It is convenient to inject this into the intravenous tubing. After the initial injection of cortical extract, 5 to 10 c.c. should be given intramuscularly every hour or two until marked improvement is ap-



parent. Synthetic cortical hormone (desoxycorticosterone acetate), 15 to 25 mg., may also be given intramuscularly. Its effect will be delayed, however, on account of slow absorption from the oil in which it is dissolved.

Within an hour or two of the initiation of treatment improvement is usually apparent and the patient may begin to take fluids by mouth. If, at the end of twenty-four hours, recovery of blood pressure and strength are sufficient and the patient is taking nourishment by mouth, intravenous therapy may be stopped. If not, the solution should be changed to 5 per cent glucose in normal saline and continued for another day or two along with intramuscular injection of cortin every few hours.

(b) *Infection*.—The presence of infection is a serious hazard in Addison's disease. Tuberculosis, which may be the cause of destruction of the adrenal glands, may also be active in some other region, such as the lung. This requires special treatment and, unfortunately, active infection further accentuates the symptoms of adrenal insufficiency and increases the cortical hormone requirement. Many cases showing no evidence of tuberculous infection exhibit a marked exacerbation of the symptoms of Addison's disease with slight upper respiratory infection or, in females, with pyelitis. Loss of strength, fever and general toxicity appear to be out of all proportion to the objective signs of infection and despite the absence of perceptible changes in the blood chemistry.

Cortical extract is the most important form of treatment in these cases, and large amounts should be administered from the outset and at frequent intervals. If the patient is dehydrated, or if he fails to take or retain adequate fluid by mouth, intravenous saline should be given. Despite such procedures the toxæmia and hyperpyrexia may progress and result in death. It is of interest to record here that in the past year we have successfully treated one case of Addison's disease complicated by severe upper respiratory infection with daganan. This drug apparently can be given with safety, provided adequate amounts of cortical hormone and fluid are also administered.

(c) *Hypoglycæmia*.—This condition may be in itself the cause of collapse in patients showing no signs of dehydration. It is generally seen in patients who have been taking salt and little or no cortin. It is remedied by the routine treat-

ment for crisis. Not infrequently hypoglycæmia accompanies the usual type of crisis.

(d) *Combined symptoms*.—In certain cases dehydration, infection, and hypoglycæmia may all be present. The treatment is routine.

When a diagnosis of Addison's disease has been made before a crisis has occurred or when a measure of health has been restored following that emergency, the question may arise as to the best treatment to pursue in order to maintain the patient in the best condition possible. This will now be dealt with.

#### GENERAL MEASURES

Certain general measures form an essential background for successful therapy over a more or less prolonged period of time. These include avoidance of extremes of temperature, fatigue and infection. Because more specific measures have recently been introduced one should not lose sight of these general points. The diet should be adequate as to vitamins and calories and, preferably, be high in carbohydrates. Avoidance of large amounts of food of high potassium content, such as meat products and chocolate, is also a wise precaution, except when the patient is receiving desoxycorticosterone. This preparation appears to adequately control normal ingestion of potassium. If alcohol is taken, it should be used in moderation and at meal time. Since these patients are hypersensitive to drugs, minimal doses should be employed when the necessity arises. Thyroid extract is contraindicated in most cases, even though the basal metabolic rate be low. Only in rare cases is this a manifestation of true hypothyroidism. Surgical operations, even of minor nature, should be undertaken only if imperative, and then after the patient has been carefully prepared over a number of days by the frequent injection of large doses of cortical extract.

#### SPECIFIC MEASURES

(a) Sodium salts have formed the keel of modern therapy in Addison's disease ever since Loeb's initial demonstration of their value in 1932. Some few patients can be maintained in moderate health and vigour with the addition to their diet of 4 to 10 grams of sodium chloride and 2 to 5 grams of the citrate daily. Each patient is an individual problem, and the dose must be adjusted according to the resulting benefit and the tolerance of the patient, as judged by the occurrence of oedema or gastric upset follow-

ing ingestion of the salt. The salts may be taken in capsule form or as enteric-coated pills. Or they may be taken in liquid form, as recommended by Ryneerson<sup>12</sup>: 10 grams of sodium chloride and 5 grams of sodium citrate to a litre of water, flavoured with fruit extracts.

(b) *Low potassium diet.*—Recognition of the fact that the ingestion of potassium salts was deleterious and might precipitate a crisis in Addison's disease led Wilder and Snell<sup>14</sup> to try the effect of a diet low in potassium. This they found to be of benefit. The preparation of such a diet requires considerable care and trouble, and it is a difficult one for people in poor financial circumstances to follow. The active hormone preparations available today raise the capacity of patients to handle ingested potassium. Nevertheless, the principle that foods high in potassium should be but sparingly consumed remains.

(c) *Aqueous extracts of the adrenal cortex.*—There are many highly potent preparations available with which it is possible to treat patients effectively without any dietary adjustment or supplement. However, it is an expensive and laborious procedure and one not recommended as routine treatment.

(d) *Sodium chloride and cortin.*—Until recently treatment with sodium chloride and cortin has been the method of choice. Intramuscular injection of 2 to 5 c.c. of cortin each day, or on alternate days, considerably reduces salt requirement. Generally patients feel better on such a regimen.

(e) *Desoxycorticosterone.*—The synthesis of desoxycorticosterone, a naturally occurring hormone of the cortex, from the soya bean has opened a new chapter in the treatment of Addison's disease. This material is available as the acetate or propionate ester, and is dissolved in sesame or peanut oil: 5 mg. to 1 c.c. Recently important contributions have been made to our knowledge of the action and use of this material. Thorn and his colleagues<sup>15</sup> have established a new form of therapy by demonstrating the effectiveness of implanted pellets of the crystalline material beneath the skin. Desoxycorticosterone esters, injected in 5 to 10 mg. daily doses intramuscularly, cause marked retention of sodium chloride and water. This results in an increase in plasma and extracellular fluid volume. A striking excretion of potassium and non-protein nitrogen also occurs. The blood pressure rises, but lags behind the

other changes. No improvement in carbohydrate metabolism is demonstrable and hypoglycæmic crises may occur in patients on this otherwise adequate form of therapy. Desoxycorticosterone given in excessive amounts is dangerous, and œdema, hypertension, cardiac dilatation and failure may occur if too much of this very potent substance is administered. This synthetic hormone, being slowly absorbed, has no part in emergency treatment of crisis in Addison's disease though it may be given as an adjunct to other treatment with a view to the exercise of its physiological effect in a few hours.

In the past two years, due to the generosity of the Ciba and Schering Companies, we have been able to treat twelve patients with desoxycorticosterone (see Table I). All of these showed

TABLE I.  
SUMMARY OF TWELVE CASES TREATED WITH  
DESOXYCORTICOSTERONE ACETATE\*

Case	Sex	Age	Duration of disease (years)	Treated with desoxycorticosterone		Results
				Injections (months)	Pellets (months)	
C.	F	30	5½	16	6	Good.
G.	M	30	10	15	5½	Good.
W.	M	47	5	6	7	Good.
McL.	M	47	5	12	2½	Good.
H.	M	18	2	9	4	Fair.
H.	M	42	2½	6	6	Fair.
N.	F	49	4	6	..	Remission: treatment discontinued.
McM.	M	48	2	6	6	Poor; invalid.
H.	M	56	4	3½	8	Poor; invalid.
C.	F	48	10	13	3	Poor; invalid.
W.	F	34	1½	4	2	Poor; invalid.
K.	F	44	1½	7	..	Died.

\* All cases had been treated with cortin and salt for some time prior to initiating treatment with desoxycorticosterone.

considerable immediate improvement, as indicated in an earlier report.<sup>16</sup> One patient has died (Case 1 of the series reported). The circumstances suggested that death was due to cardiac failure, but since the patient died outside hospital and no autopsy was obtained we cannot be definite. One other patient has entered a remission and now requires no hormone therapy. This case is exceptional. In the other ten patients pellets of crystalline desoxycorticosterone have been implanted subcutaneously in the manner described by Thorn and his associates.<sup>15</sup> In four of these the results have been good; in two,

fair. The remaining four have fared indifferently. After a few weeks of apparent satisfactory progress, three of the last group have suffered from loss of appetite, hypoglycæmic attacks, oedema of the ankles, cardiac irregularities, and falling blood pressure due, we believe, to cardiac failure. The fourth patient received but one pellet and no added salt but showed oedema from the outset. None of these cases was overtreated, and it would seem reasonable to conclude that the heart shares in the asthenia so markedly evident in the skeletal muscles. It is of interest that improvement occurred in two of these cases when aqueous cortical extract was given as well as desoxycorticosterone. On this evidence and on experimental grounds it seems likely that desoxycorticosterone is not a complete substitution for the missing adrenal cortex.

We anticipate that the chemist will yet place at the disposal of the clinician chemical sub-

stances which will permit even fuller substitution therapy than so far has obtained in the treatment of Addison's disease.

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## RETINOPATHY IN DIABETICS\*

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HIRSCHBERGER<sup>1</sup> in 1890 described a central punctate retinitis in a diabetic. Since then this picture has come to be associated with a retinopathy occurring in diabetics. It consists of deep, round, punctate hæmorrhages in the macular region. These hæmorrhages may be quite numerous; on the other hand there may be only two or three, or occasionally only a single one. Associated with them small, yellow exudates appear, which from the similarity of their shape and situation are probably the result of hyaline degeneration occurring in old hæmorrhages. At a later stage these yellow exudates tend to coalesce, forming larger patches or plaques, and to be deposited in a circular area around the macula. The disc is normal or nearly normal; the vessels show only a mild grade of arteriosclerosis or none at all; and in the typical case there are no retinal oedema or cotton-wool exudates.

There has been much argument as to whether these changes are the direct result of diabetes

or the result of cardiovascular-renal disease entirely independent of any diabetes which may be present. The reported frequency of the occurrence of these changes varies from 4.8 (Camidge<sup>2</sup>) to 38 per cent (Gresser<sup>3</sup>) with an average of between 14 and 16 per cent. Most authors agree that retinitis in diabetics is more frequent with the increasing age of the patient and the duration of the diabetes, when arteriosclerotic and hypertensive changes also become more common.

Opinion as to the effect of severity of the diabetes on the occurrence of retinopathy is more or less evenly divided. For some time the majority of opinion favoured the view that the retinopathy in diabetics was due entirely to vascular degeneration and was quite unrelated to any metabolic condition present. More recently, however, opinion seems to be veering in the opposite direction. For instance, Wagener and Wilder<sup>4</sup> in 1921 claimed that "diabetic retinitis" is almost always complicated by vascular and renal disease, and that the diabetes is only secondary. Later, in 1934, the same authors<sup>5</sup> reported cases where this

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type of retinopathy had been observed and yet no clinical evidence of vascular disease could be found, and concluded that the diabetes alone does something to injure the smaller vessels of the retina. Reese<sup>6</sup> has summarized the position as follows. Arteriosclerosis of varying degrees is present in a large percentage of diabetics with retinitis, and hypertension and kidney disease in a smaller percentage. However, the typical retinitis occurs in diabetics whether with or without arteriosclerosis, more frequently than in non-diabetics with arteriosclerosis.

Wagener, Dry and Wilder<sup>3</sup> classify the changes into five stages: (1) with hæmorrhages alone; (2) hæmorrhages associated with punctate exudates; (3) hæmorrhages associated with punctate and cotton-wool-like exudates; (4) hæmorrhages or exudates associated with visible lesions in the retinal veins; (5) visible lesions in veins with hæmorrhages in the vitreous and proliferation of new vessels and formation of scar tissue. During the time that the cases here reported were being observed two cases were seen which come under the fifth heading. Our impression, however, is that there is some other factor, not yet determined, which is responsible for this condition, and these cases will not be included.

The cases here reported are from the diabetic clinic at the Toronto Western Hospital. The intention is eventually to do a routine examination of all the eyes of the diabetic clinic patients, which will give us a cross-section of the occurrence of retinopathy in these patients.

TABLE I.  
AGE

	Patients	Retinopathy—Type (Wagener)				Total	Percentage
		I	II	III	IV		
Under 30 yrs.	7	0	0	0	0	0	0
30 to 39 yrs.	5	1	0	0	0	1	20
40 to 49 yrs.	16	3	0	0	2	5	31
50 to 59 yrs.	32	5	4	1	4	14	44
60 to 69 yrs.	30	4	8	1	6	19	63
70 to 79 yrs.	10	1	0	0	3	4	40
	100	14	12	2	15	43	43

This series comprises the first 100 cases which have been partially selected in that those with known or suspected cardiovascular-renal disease or with eye complaints have been referred to the eye clinic earlier than others. As a result of this the total percentage of 43 found to have retinopathy is probably considerably

higher than will be the case when the whole clinic has been examined. However, it is felt that an analysis of these cases might serve a useful purpose in helping to determine the causation of retinopathy.

Table I gives the percentage of cases of retinopathy occurring in patients of different age-groups and the different types of Wagener's classification. Of the total series only 2 fell under the heading of Type III. The remainder were fairly evenly divided between Groups I, II and IV. It will be seen that the percentage shows a steady increase with the increase in age. It might be suggested that this is due to increase of cardiovascular-renal disease. Table II shows a comparison in percentages of the occurrence of retinopathy for the age-groups among all the patients and those of known cardiovascular-renal disease.

TABLE II.  
AGE AND CARDIOVASCULAR-RENAL DISEASE

	Total patients percentage with retinopathy	Patients with cardio- vascular-renal disease percentage with retinopathy
Under 30 years...	0	0
30 to 39 years...	20	0
40 to 49 years...	31	25
50 to 59 years...	44	44
60 to 69 years...	63	66
70 to 79 years...	40	40
	43	46

The patients with cardiovascular-renal disease clinically had elevated blood pressure, signs of peripheral arteriosclerosis, heart lesions, or obvious kidney damage. The frequency of retinopathy among these becomes greater with increasing age in a manner paralleling that for the whole group. The total number of patients with known cardiovascular-renal disease was 74, of whom 34, or 46 per cent, had retinopathy. On the other hand, of 25 patients without demonstrable cardiovascular-renal disease, only 6, or 24 per cent, had retinopathy. One must conclude, therefore, that cardiovascular-renal disease must be a factor in causing the retinopathy, but this still leaves 6 cases of retinopathy without cardiovascular-renal disease which must be accounted for in some other way.

Table III shows the relative frequency of retinopathy with duration of the diabetes. The times given for duration are actually the times since diagnosis was made, and the probability

TABLE III.  
DURATION

	<i>Patients</i>	<i>Patients with retinopathy</i>	<i>Percentage of whole group with retinopathy</i>	<i>Percentage of those with cardiovascular-renal disease with retinitis</i>
Up to 2 yrs.	26	6	23	22
3 to 4 yrs.	20	4	20	33
5 to 9 yrs.	21	14	66	70
10 to 15 yrs.	21	11	58	55
Over 15 yrs.	9	5	55	70

is that if we could tell more accurately just when the diabetes started there would be fewer in the earlier groups and more in the later. It will be seen that a duration of longer than five years greatly increases the incidence of retinopathy. This also applies to those with cardiovascular-renal disease.

TABLE IV.  
SEVERITY AND CONTROL

	<i>Patients</i>	<i>Retinopathy</i>	<i>Percentage</i>
Mild; good control	22	6	27
Mild; fair control	9	4	44
Mild; poor control	10	2	20
Moderate; good control	11	5	45
Moderate; fair control	12	7	58
Moderate; poor control	12	7	58
Severe; good control	2	1	50
Severe; fair control	11	5	45
Severe; poor control	11	6	55

TABLE V.  
SEVERITY AND CONTROL

	<i>Patients</i>	<i>Retinopathy</i>	<i>Percentage</i>	<i>With cardiovascular-renal disease percentage</i>
Total; mild	41	12	27	30
Total; moderate	35	19	54	63
Total; severe	24	12	50	59
Total; good control	35	12	34	40
Total; fair control	32	16	50	57
Total; poor control	33	15	45	50

TABLE VIII.

<i>Name</i>	<i>Age</i>	<i>Duration (years)</i>	<i>Severity</i>	<i>Control</i>	<i>Blood pressure</i>	<i>Non-protein nitrogen mg. per 100 c.c.</i>	
R.A.	38	1	B	2	100/58	37	B. M. R. -18.
R.C.	45	7	C	2	110/75	42	Careless, frequent reactions.
D.H.	49	15	C	3	120/84	42	Alcoholic; careless; no reactions.
R.K.	51	8	B	1	148/70	33	
S.M.	58	2	A	2	160/70	42	Blood urea 19.
A.W.	45	10	B	2	140/80	37	Acute hyperthyroidism, 1930.

A—Mild. B—Moderate. C—Severe. 1—Good control. 2—Fair control. 3—Poor control.

Tables IV and V show the relative proportions in those with varying degrees of severity and control. It will be noticed that the frequency is considerably greater where the severity is moderate or severe as compared with the mild cases. On the other hand, control seems to be a less noticeable factor. Here again the figures for those with cardiovascular-renal disease closely parallel the total figures.

TABLE VI.  
SYSTOLIC BLOOD PRESSURE

	<i>Patients</i>	<i>Retinopathy</i>	<i>Percentage</i>
Under 120	18	4	22
120 to 139	22	5	22
140 to 169	32	15	47
170 to 199	17	10	57
Over 200	8	7	87

TABLE VII.  
DIASTOLIC BLOOD PRESSURE

	<i>Patients</i>	<i>Retinopathy</i>	<i>Percentage</i>
Under 70	4	1	25
70 to 79	20	7	35
80 to 89	30	9	30
90 to 99	21	8	38
100 to 119	15	10	66
Over 120	7	6	85

Tables VI and VII show the relative occurrence of the retinopathy in different groups of systolic and diastolic blood pressure. It will be seen that as the systolic blood pressure increases a much larger number of diabetics tend to get retinopathy. This is true also, but less markedly so, with increase in the diastolic blood pressure. If the systolic blood pressure has passed the level of 140 retinopathy becomes much more frequent, and a patient with systolic blood pressure of 200 and diastolic blood pressure of 120 seldom escapes getting retinopathy. This must be considered as evidence that hypertension plays a part in the production of retinopathy, but that it cannot be the only factor is evidenced by the fact that of 72 patients with a systolic

pressure under 170, 34 per cent had retinopathy, while 31 per cent of 34 patients with a diastolic blood pressure under 90 had retinopathy.

Table VIII summarizes the findings in the 6 patients with retinopathy in whom no evidence of cardiovascular-renal disease was found. Examination included auscultation of the heart, blood pressure reading, chemical and uric acid urinalysis, blood sugar with fasting, inspection and palpation of the extremities for cyanosis, edema, pallor or clonus, or dependent rubor and arterial pulsation. It did not include chest x-ray, the roentgenologic graph, electrocardiogram, or kidney function test. For this reason it is possible, but we feel not likely, that further investigation would reveal some cardiovascular-renal disease.

As would be expected the average age for this group is less than for the whole, only 2 being over fifty. Duration of the diabetes ranges from 1 to 15 years, apparently being a factor in producing retinopathy. Only one case is mild and only one has good control. However, the mild case has a very potent type of diabetes, type I insulin and the case with good control has never had any larger intake of insulin. So that there is for the retinopathy control not on the severity and control of the diabetes in all cases.

#### CONCLUSION

In the series of prediabetic patients the incidence of retinopathy increases with advancing

age, and duration and severity of diabetes, and the association of cardiovascular-renal disease. However, there are 6 cases of retinopathy in the series without cardiovascular-renal disease, and the main factor in this group appears to be the severity and control of the diabetes. This factor, however, cannot be responsible for all the cases of retinopathy. The only factor, so far discovered, common to all these cases is the diabetes itself, and until some other factor is discovered diabetes retinopathy must be considered a clinical entity, in which the vessel walls of the diabetic are affected by some factor other than and in addition to those operating in cardiac disease, hypertension and nephritis.

We are indebted to Dr. Angus Mackay, in charge of the diabetic clinic at the Toronto Western Hospital, for advice and encouragement as well as facilities for examining these patients.

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## THE OCULAR MANIFESTATIONS OF VITAMIN A DEFICIENCY\*

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WITHIN the past decade our knowledge of the vitamins has increased tremendously. We now have some clues as to their chemical nature and physiological functions, and are fairly familiar with many of the clinical manifestations of their deficiencies. It is my purpose to deal briefly with vitamin A, which was one of the first of the vitamins to be discovered.

Vitamin A is a conjugated protein and a derivative of the carotenoid pigments from plants. Thus the vitamin A content of our diet

comes directly or indirectly from the plant kingdom. The carotenoid substances (alpha, beta and gamma carotene, and cryptoxanthin) supply probably the greatest amount. Carotene is frequently referred to as pro-vitamin A. As far as we know, animals and human beings are unable to synthesize either carotene or vitamin A in their bodies, but, rather, must depend on exogenous sources for their supply. There are definite physical and chemical differences between vitamin A and carotene and it is now thought that carotene breaks down in the body to form two molecules of vitamin A. In the human body the liver is the main organ concerned with this transformation. Wald *et al.*<sup>1</sup>

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however, have recently reported that the pigment epithelium of the retina may play an important rôle in the transformation of carotene into vitamin A for the needs of the visual process. Vitamin A and carotene are both absorbed in the small intestine, and their absorption is dependent on a normal fat metabolism. Disturbances of fat metabolism may give rise to signs or symptoms of vitamin A deficiency, even in the presence of an adequate intake.

The principal dietary sources of carotene are the green vegetables, lettuce, spinach, etc. The carotene content follows the chlorophyll content quite closely. Tomatoes, peppers, and fruits, which were once green but have ripened, also contain appreciable amounts of carotene. The next most important sources of carotene and vitamin A are milk and its products and eggs. The presence of vitamin A as such is due to the conversion of carotene into vitamin A in the animal; the amount depends on the available carotene in the animal's food and may show considerable seasonal variation. The principal animal tissue supplying vitamin A is liver, as it contains the body stores. Canning, rapid freezing, and boiling fortunately do not destroy the carotene or vitamin A content of foods.

The clinical manifestations of a severe vitamin A deficiency are subjective night-blindness and objective pathological changes in certain epithelial tissues. The latter consist of atrophy of the epithelial cells, reparative proliferation of the basal cells, and differentiation of the new product into a keratinized, stratified squamous epithelium. These changes are found most commonly in the eyes, respiratory tract, skin, and genito-urinary tract as well as in the ducts of many glands. The central nervous system in human beings is apparently unaffected.

The ocular signs, which are known as keratomalacia and xerophthalmia, consist of a drying and metaplasia of the epithelium of the cornea and conjunctiva, which, if long continued, may lead to irreparable damage and loss of vision. These pathological changes are associated with night-blindness but are not the cause of it. The rôle of vitamin A in the visual cycle will be discussed subsequently.

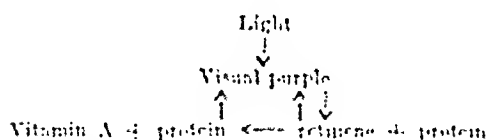
The cutaneous manifestations of this deficiency are analogous in their pathological nature with those occurring in other epithelial structures. The skin becomes dry and rough, with papular eruptions caused by hyperkeratosis of the hair

follicles. The sebaceous glands atrophy and undergo keratinizing metaplasia. The papular eruption appears on the antero-lateral aspect of the upper forearms and the extensor surface of the arms and legs. There is also a generalized increase in the pigmentation of the skin and conjunctiva.

The respiratory and genito-urinary complications are due to the same pathological process, and have been frequently observed in young infants. In rats fed on a vitamin A deficient diet renal calculi are frequently formed, and there have been several reports of human urinary lithiasis being associated with this deficiency. The gross pathological features in man and in animals are thus the outcome of the accumulation of keratinized epithelial cells in glands and in their ducts as well as in the skin.

That nutritional deficiencies may cause night-blindness has been known for many centuries. Hippocrates recommended liver and the Chinese certain green herbs as a cure for this disorder. However, it has been only within the past decade that the rationale of this therapy has been shown to be due to their high vitamin A content. Dark adaptation is the well known phenomenon of visual adaptation that takes place when one enters a dark room on a bright sunny day. Bright light bleaches the visual purple contained in the rods of the retina, and one's ability to adapt to dim light depends on the amount and rate of regeneration of visual purple. The earliest symptom of night blindness is, therefore, poor dark adaptation. It must not be forgotten that there are certain congenital forms of night-blindness caused by local changes in the retina; these have no relation to deficiency of vitamin A.

The rôle of vitamin A in the visual cycle has gradually been evolved in the past few years. As mentioned above, it was found that vitamin A cured certain forms of night-blindness. Then the regeneration of visual purple *in vitro* was found to be delayed in retinas obtained from animals on a vitamin A deficient diet. Later it was found that vitamin A deficiency could be cured in experimental animals by feeding them whole retina. Finally, vitamin A was found in specially prepared extracts of the retina itself. The following scheme of Wald<sup>2</sup> is now generally accepted as representing the basic physiological chemistry of dark adaptation, and from it one can readily see the rôle of vitamin A in the regeneration of visual purple.



Until the past few years, however, the measurement of adaptation to darkness was relegated to the research laboratories for those interested in the problems of visual physiology. With the realization that vitamin A played an integral rôle in the visual cycle interest in this commonplace phenomenon has been awakened. The quantitative measurement of dark adaptation as a diagnostic test of early vitamin A deficiency has been widely accepted, too hastily, I am afraid, in many instances.

There are now several instruments on the market for the measurement of dark adaptation; most of them claim to be simple in operation, and rapid and accurate in the diagnosis of subclinical vitamin A deficiency. The general principle of the test is to first expose the patient's eye to a bright light which bleaches the visual purple, and then during a fixed period of adaptation to determine the minimum light that the patient can just see, or to ascertain the time he takes to see a light of a fixed low intensity. It is not my purpose to discuss the relative merits of the different instruments now available, but in my hands, using an instrument that fulfils the physiological requirements as nearly as possible, the measurement of dark adaptation has not proved to be a reliable test of vitamin A deficiency in what might be considered borderline cases. Inability to see well at night and susceptibility to glare, especially that of headlights, has frequently been thought to be caused by vitamin A deficiency. In examining patients with these complaints I have not been able to demonstrate poor dark adaptation except in those with pathological changes in the retina. To interpret the findings in these routine tests one should have a thorough knowledge of the physiology and pathology of the eye in order to avoid what one might call "false positive" results.

Within the past year or so several methods for determining the vitamin A and carotene content of the blood have been developed. This can be done by means of a photoelectric colorimeter or spectrographically. It is not, however, as yet a generally accepted test for vitamin A deficiency. Several of the reports have failed to state whether or not fasting blood was used,

and there has been little standardization of the methods employed. Further, there is scarcely any evidence as to whether or not the vitamin A in the blood is an index of the body stores. Steininger *et al.*,<sup>2</sup> in a well controlled experiment, showed that the amount of vitamin A in fasting blood is dependent on the amount in the diet, and that there is no correlation between the amount of vitamin A ingested and the biophotometer readings. I have not had any experience with the determination of vitamin A in the blood, but feel certain that a convenient, direct and objective method will replace the less reliable and subjective method of measuring dark adaptation as a test of vitamin A deficiency.

Patients with advanced avitaminosis A are rarely seen in this country. The papular eruption and the ocular complications of drying and softening of the cornea respond promptly to specific treatment. There are however certain diseases that may have an associated vitamin A deficiency even in the presence of an adequate diet. Patients suffering from diseases of the liver, especially cirrhosis, are frequently found to be deficient in vitamin A because of the poor conversion of carotene into vitamin A and interference with the body stores. These patients have been found to require extremely large doses of vitamin A (50,000 to 100,000 units a day) and recovery is very slow, though the maintenance dose need not be as large. In children, congenital obliteration of the bile ducts, fibrosis of the pancreas, celiac disease, and cretinism frequently have an associated vitamin A deficiency. An important point to remember is that carotene is extremely soluble in liquid petrolatum, and therefore in combination with it is poorly absorbed. Vitamin A is not nearly as soluble, so should be given with liquid petrolatum if the latter is required.

There are several other diseases which are considered by some to have an associated vitamin A deficiency. That deficiency of vitamin A can cause urinary lithiasis in experimental animals is a well accepted fact, but that it may be a cause of stone in human beings is still a debatable point. Some observers have noted vitamin A deficiency, based on the dark adaptation test, in persons with urinary lithiasis, but attempts to reduce the incidence of stone in chronic stone-formers have been unsuccessful. There have also been reports of vitamin A deficiency occurring in hyperthyroidism, and it seems reasonable to assume that vitamin A would



be more rapidly destroyed when the metabolic rate is increased from any cause. There have been several reports in the German literature of marked improvement of adolescent goitre and mild hyperthyroidism with vitamin A, but this has not been confirmed in this country.

Vitamin A was at first considered to have marked anti-infective properties, and was administered orally and locally for all types of infections. It is known now that severe deficiencies tend to lower the resistance to infection, and that a moderate deficiency may prolong the course of respiratory infections in man, but there is little justification for calling vitamin A the "anti-infective vitamin". The local use of vitamin A in superficial infections is of very questionable value.

The average daily requirement for adults is 2,000 to 3,000 international units, and a diet containing 500 c.e. of milk, one egg, 25 g. of butter, and one serving of greens is quite enough to meet the above requirements. In pregnancy or illness at least 5,000 units should be supplied, and 6,000 to 8,000 units should be ample for a growing child. There are many vitamin A preparations on the market now and those from any reputable drug house should be quite satis-

factory. I have found that preparations containing both vitamin A and D, if prescribed in large doses, cause an annoying feeling of fullness, and that unless vitamin D is indicated it is better to prescribe vitamin A alone. One can now obtain concentrates containing anywhere from 5,000 to 50,000 units per capsule. Unless the body stores are greatly depleted or there is a marked deficiency it should seldom be necessary to prescribe more than 10,000 units a day.

The incidence of vitamin A deficiency varies no doubt with the socio-economic status of the patients, their geographical distribution, and the enthusiasm of the reporter. Like most of the vitamins vitamin A has been exploited and has been recommended for everything from sterility in the male to cancer. It is to be hoped that its therapeutic value will be enhanced by a more thorough knowledge of its rôle in human metabolism, and that it will not be prescribed in shotgun mixtures as many of the vitamin products are.

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## SULFANILAMIDE PER RECTUM

By EDWARD H. WOOD

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IT has been our custom for several years to endeavour to give all the immediate post-operative fluids per rectum. The reason for this will not be detailed. There are, of course, some cases in which intravenous fluids are required, hypertonic saline, transfusions, etc. By the use of rectal injection, carefully given, the patients requiring fluids in other ways have become progressively fewer. It must be noted at once that, in general, the simple abdominal operations are given no fluid by mouth for twenty-four hours, and this time is extended up to forty-eight or beyond according to circumstances. Atropine, gr. 1/200 to 1/100 (the latter dose in robust adults), is given, hypodermically, regularly every four hours during the time rectal fluids are being administered. This keeps the bowel at rest, assists in the retention of the rectal fluids, and in addition, lessens the pain and inhibits the

swallowing of air, thus reducing distension. A total opium glueoside preparation for pain is preferred to morphia. No effort is made to move the bowel for four to five days. Should there be gas, and it is troublesome, a small enema of 1 to 3 ounces of warm glycerine without water may be given, but not till well into the third twenty-four hour period. In general, the less of such interference the better. Remember, "rest in pain" is just as valuable today as it ever was.

The basic criterion on which to judge as to how much fluid is required by the individual patient is simply this, that there be enough to carry on the physiological functions, but at a rate lower than normal. This is judged mainly in that as long as there is excretion of urine and it is not pathologically concentrated, the system has enough fluid.

The rectal solution used is 1 per cent glucose in normal saline. The injection is made, using a large catheter or small enema tube and a small funnel, at the rate of 2 ounces per minute or slower. The basic doses for an adult being 20 ounces on returning to bed and 10 ounces every 4 hours.

This basic routine, plus systematic exercises (begun gradually twenty-four hours post-operatively) for feet, legs, abdominal muscles, arms and hands, followed by strong respiratory efforts and minus the Gatch frame (simply elevate the head of the bed properly) has proved very satisfactory.

With such a routine the problem presented itself of how to use sulfanilamide in the control of peritonitis and other infections and the prevention of post-operative pneumonia. Oral administration was out for the first day or two at least. There was never much enthusiasm for the intermuscular route, and one object of our routine was to avoid intravenous injections where possible.

The only method of administration left was per rectum. Sulfanilamide crystals or powder (not tablets) will dissolve in tap water at room temperature up to about 0.8 per cent, i.e., approximately 4 gr. to the ounce. This is a weak solution, non-irritating and might absorb readily. Some of this could replace the saline-glucose of our routine injection. At least it would supply the required fluid.

Dosages were worked out so as to give a little more than the average oral dose. A winchester was filled with warm water. At four grains to the ounce, this would dissolve 320 grains. An excess was added, i.e., about 400 grains, the whole thoroughly shaken several times, allowed to settle, and the clear fluid decanted off and used for the rectal injections. As the fluid was removed from the winchester it was replaced by water and the whole again shaken. When the residual sediment of sulfanilamide became low, more powder was added. Thus a saturated solution was always at hand and required no scales or measures of any kind. Sufficient time must be given for the slowly soluble drug to get into solution.

As to administration, the quantity of the sulfanilamide solution decided upon is brought up to the four-hourly fluid quantity, as outlined above, by simply adding the glucose-saline solution to it, i.e., if for the first post-operative dose one decides on 40 gr., take 10 ounces of sulfa-

nilamide solution, make it up to 20 ounces with glucose-saline and inject it over a ten to twenty-minute period. If, for the second dose, one decides on 30 gr., take  $7\frac{1}{2}$  ounces of the solution and bring it up to 10 ounces with glucose-saline.

Having decided on the method as above, it was put on trial. Three male patients were each given 9 ounces (36 gr.) of the solution and at the end of twenty-four hours their blood sulfanilamide was taken. Results were:

Mr. H., weight 154 lb.	Blood test, 1.9 mg.
Mr. H., " 126 "	" " 2.5 "
Mr. M., " 145 "	" " 3.0 "

This proved that sulfanilamide, when administered as a saturated solution per rectum, can be absorbed into the blood stream.

The therapy has now been applied in various types of cases, both surgical and medical, for example lobar pneumonia carried through with none given by mouth. The therapeutic results are satisfactory, the complications are lessened, and the method is simple.

Blood concentration of 12.5 mg. was obtained in one case after the injection of 260 grains. This was in a child of twelve with diffuse peritonitis associated with a ruptured gangrenous obstructive appendicitis. Rectal sulfanilamide was given for three days as follows, 5 ounces every four hours:

After 60 grains blood showed 2.5 mg. and urine 2.1 mg.

After 240 grains blood showed 9.0 mg. and urine 48.0 mg.

After 260 grains blood showed 12.5 mg.

There was some cyanosis which cleared up promptly with treatment as outlined below. There was no vomiting and the lad made a good recovery.

#### CASE REPORT

Miss R., aged 28, weight 135 lb. Acute gangrenous, perforative, obstructive appendicitis, with diffuse peritonitis. "Patient received 400 grains of sulfanilamide in 0.8 per cent solution per rectum (5 pints). Her post-operative temperature was 101.8°. Since the first day the temperature did not go above 100°, became normal, and remained so after the fifth day. She has made an uneventful recovery. There was no vomiting. After receiving 52 ounces of the solution (about 210 gr.) in forty hours, the blood showed 5 mg. of sulfanilamide. There was moderate cyanosis which was corrected by methylene blue."

This brings us to the treatment of cyanosis as caused by sulfanilamide. The treatment is equally effective in connection with any method of administration. First—omit one dose of the

drug. Second—replace it by a rectal injection of 10 ounces of glucose-saline solution in which have been dissolved 5 to 10 gr. of methylene blue. In four hours begin smaller doses of sulfanilamide.

#### SUMMARY

1. This paper presents a simple, sure method of giving sulfanilamide.

2. Rectal administration of sulfanilamide, whether for surgical or medical cases, causes fewer complications.

3. The method is advised in particular for the use of the general practitioner who has no first-class hospital facilities, or for the benefit of the patient, say with lobar pneumonia, who cannot be safely moved in from a snow-bound side

road and whose stomach rejects oral administration.

4. It is brought forward at this particular time as a military measure when bombing and shelling make asepsis difficult.

5. Though it has these two fields, the men in the finest hospitals will find it very comforting.

6. Sulfanilamide per rectum as a post-operative measure is urged in all cases where the peritoneum is contaminated or pneumonia is threatening.

7. Sulfanilamide per rectum gives prompt results in mucous colitis.

8. Sulfapyridine cannot be exhibited in this manner with satisfactory results; sulfathiazole has not been tried.

### SYMPATHETIC BLOCKADE IN PERIPHERAL VASCULAR ACCIDENTS\*

By N. W. ROOME

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#### INTRODUCTORY

**ALTHOUGH** the recent adaptation of heparin to vascular surgery by Murray<sup>1</sup> has rendered embolectomy much more useful than previously, certain cases with peripheral vascular accidents remain for which the procedure is not suitable. In regard to embolism, the indications and contraindications for the operation have been repeatedly discussed by Key,<sup>2</sup> Griffiths,<sup>3</sup> De Takats,<sup>4</sup> and others, and remain applicable when heparin is not available, or applicable with modification when heparin can be used. Some of these authors discuss the alternative non-operative methods, which are concerned chiefly with the alleviation of the spasm of the collateral vessels. These "spasmolytic" methods include the application of heat to the abdomen and extremities, the administration of vasodilator drugs, the use of passive vascular exercise machines or intermittent venous obstruction, and exposure to x-rays. None of these methods is universally accepted as valuable, however, as will be discussed later. Leriche<sup>5</sup> has practised arteriectomy, the removal of a segment of the involved artery, in cases of chronic arterial obstruction with vasomotor changes.

The vascular accidents other than embolism, such as arterial thrombosis and thrombophlebitis,

have been treated largely by similar non-surgical methods, although removal of the thrombus from peripheral arteries and veins has occasionally been practised. Heparin is apparently of use in these cases, although the mechanism of its action is not entirely understood (Murray<sup>1</sup>). Injury of a large artery must be treated by suture if possible.

Lumbar sympathetic blockade has recently been recommended for the treatment of acute thrombophlebitis by Leriche<sup>6</sup> and Ochsner and DeBaakey.<sup>7</sup> This therapy depends on the presence of a reflex vasospasm, which reduces the blood flow, and thus produces pain, swelling, and often further thrombosis. Meyer<sup>8</sup> has apparently used this method in the treatment of arterial embolism, and Leriche and Werquin<sup>9</sup> recommend it as an alternative to periarterial sympathectomy when injured arteries cannot be sutured but must be ligated, as is frequently the case in war wounds.

Pain usually accompanies a sudden vascular occlusion, and in many cases it is of great severity and very difficult to manage. Although it was at first thought to be due to irritation of the artery at the site of its plugging, Lewis<sup>10</sup> believes that it is due to ischaemia of muscle, pointing out that embolism of muscular structures (heart, extremities, bowel) is painful, while

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similar obstructions in non-muscular structures (brain, lung, spleen) are relatively painless.

In the first case to be described the treatment of embolism by lumbar sympathetic blockade was tried on the basis of the analogous therapy for vasospasm in thrombophlebitis, which had been found effective in a previous series of cases. In the second case, the relief of severe pain was the chief effect desired.

### TECHNIQUE

The blockade of the lumbar sympathetic chain was carried out, much as described by Oelsner and DeBakey,<sup>1</sup> briefly as follows. After skin sterilization, a 5-inch, 20-gauge, needle is inserted through a procain wheal about two inches lateral to the spinous process of the 3rd lumbar vertebra. It is advanced almost directly anteriorly until the transverse process of the vertebra is identified by impingement upon it, about  $1\frac{1}{2}$  to 3 inches beneath the skin. Then the direction of the needle is shifted slightly, so that it may be passed just inferiorly to the transverse process, and slightly toward the midline, so as to identify the body of the vertebra by impingement upon it. The tip of the needle is advanced almost in contact with the body of the vertebra to a point 2 to  $2\frac{1}{2}$  inches beyond the level of the transverse process. The anesthetic solution, usually 20 c.c. of 2 per cent procain, is then injected, after aspiration with the needle to preclude injection into an artery or vein. Bleeding is occasionally encountered, as the aorta and the vena cava are in fairly close relationship to the sympathetic trunks, but is usually not a serious complication. The needle is then withdrawn to the level of the lateral process, and a similar advancement made just over its superior edge. The second injection made in this way should lie approximately 1 to 2 inches above the first injection.

### CASE 1

Mrs. A.M., aged 75 years, was admitted to the Victoria Hospital on March 12, 1940, with a diagnosis of bronchopneumonia, auricular fibrillation, and diabetes mellitus. In 1936 she had recovered from a paresis of the right lower extremity, presumably due to a cerebral vascular accident, and in 1937 had had a thrombophlebitis of the left lower extremity. Her condition rapidly improved on sulfapyridine and diabetic management.

On March 17th, at 3.30 a.m., she awakened with severe pain in the left leg, which was found cold and blanched. The leg was elevated slightly, radiant heat applied, and codein given. Then repeated hypodermic doses of morphine gr.  $\frac{1}{4}$  (15 mg.) were given without relief of pain. She was seen in consultation at 11 a.m. the same day. At this time she was obviously in great pain; there was no pulsation of any artery

of the left lower extremity; the left leg was blanched and anaesthetic over its lower two-thirds, and hypersensitive in its upper third; the arteries of the right lower extremity were pulsating. A diagnosis was made of embolism (or thrombosis) of the left common iliac and/or common femoral arteries. Embolectomy was not attempted. Thirty c.c. of 2 per cent procain was infiltrated about the left sympathetic chain, as described above. Within ten minutes there was complete relief of pain, and although she complained slightly of the residual numbness she promptly went to sleep. At 6 p.m. it is noted on the hospital chart that she had "remained fairly comfortable all afternoon", but at 9.15 p.m. 0.5 c.c. (10 mg.) of pantopon was given for pain. The pain increased, and was "very severe" at 11.30 p.m., so that a second infiltration was done at 12.15 a.m., with prompt relief. The infiltration was repeated at 10 a.m., March 18th, following which there was "relief of pain in a few minutes". This effect lasted until 11 a.m. the following morning, when 50 c.c. of 1:1,500 procain was infiltrated. This gave relief until nearly 12.30 a.m., March 20th, when 20 c.c. 1:500 procain was used, following which the patient "slept well" until awakened at 6 a.m. On March 21st the pain recurred and, as it was not relieved by 2 c.c. (40 mg.) pantopon, 10 c.c. of 2 per cent procain and 12 c.c. 1:500 eucopin were infiltrated at 8 p.m., with "relief immediate". Only slight pain recurred thereafter and no further infiltrations were done. During the above period, pantopon and radiant heat were used in conjunction with the lumbar chain blockade, but, as pointed out, these methods were inadequate alone.

Although there was considerable regression of the upper limit of anaesthesia, gangrene of the foot and a small portion of the lower third of the leg occurred. A lower thigh amputation was done on April 23rd, which was followed by primary healing, and the patient subsequently walked out of the hospital.

Pathological examination of the amputated leg, by Dr. J. H. Fisher, revealed arteriosclerosis with extensive arterial thrombosis.

### CASE 2

Mrs. M.C., aged 75 years, was admitted to the Victoria Hospital on August 19, 1940, about three hours following the sudden onset of pain, weakness, and numbness of both lower extremities. There was a history of the sudden onset of auricular fibrillation, nine days previously. Morphine, gr.  $\frac{1}{2}$  (30 mg.) hypodermically, had had no appreciable effect in relieving the pain, and when she was seen in consultation at 9.15 p.m. she was writhing with pain. The lower extremities were cold, blanched, and pulseless. Embolism (or thrombosis) of the aorta was diagnosed, and embolectomy deemed inadvisable. Accordingly, 20 c.c. of 2 per cent procain was infiltrated about each lumbar sympathetic chain, with complete relief of pain in about 15 minutes, although she complained of the residual numbness. She was markedly shocked, and died at 5.30 p.m. August 21st. During the interval there was no return of pain, although gangrene of several toes and cyanosis of the abdominal wall were noted.

### DISCUSSION

Prompt and complete relief of pain occurred in each of the two peripheral vascular accidents described, following sympathetic blockade, while large doses of morphine had no appreciable effect. It would seem, therefore, that this procedure is an invaluable one for the relief of this most distressing pain.

It is interesting to consider the physiology concerned with this relief of pain. The infiltration

tion presumably lessens the extent of the ischæmia, but does not eliminate it, as evidenced by the occurrence of gangrene in each case; thus a considerable area of ischæmic muscle remains after the injection, but without appreciation of pain therefrom. Therefore, if the pain of embolism is from ischæmic skeletal muscle, it follows that either the afferent pathway is by the sympathetic chain, or, alternatively, the remaining areas of ischæmic muscle lie entirely in the peripheral zone of anaesthesia due to nerve injury. Another possibility is that the source of pain is the spastic blood vessels, which relax by the interruption of either efferent or afferent pathways by the infiltration. No evidence was derived from the present cases in favour of any one of these possibilities, except that the long period of relief from a single injection suggests that the relief is not due merely to interruption of sensory impulses.

This method of relieving vasospasm is probably the most effective available, short of actual lumbar sympathectomy, and is without the disadvantages of other spasmolytics. Application of heat to the abdomen and extremities produces dilatation, but there is some danger of increasing the local metabolism and thus the demand for a blood supply (De Takats<sup>4</sup>). In the first case described pain persisted in spite of the application of heat. Various vasodilator drugs have been used, including papaverin, mecloholyl, and the nitrites, but maximal doses cannot be given without reducing the general blood pressure, which results in a diminished peripheral blood flow. The same objection applies to spinal anaesthesia. The Pavaex treatment, and intermittent venous occlusion, have been recommended by some, but most of the recent writers feel that little assistance is offered by these methods. X-ray therapy has been used rather infrequently, and would seem best reserved for the treatment of thrombophlebitis or chronic arterial occlusion. In this connection, Langeron<sup>11</sup> cites a case which he treated successively by embolectomy, periarterial sympathectomy, and finally radiotherapy.

The injections of percain and of eucupin in case 1 were made in order to determine if longer periods of relief could thus be obtained than with procain. The latter drug resulted in relief for approximate periods of 9, 12, and 24 hours, while percain resulted in 13 and 40 hours, and

the eucupin more than 12 hours. Since all these periods are considerably longer than the actual blockade probably exists, it would seem that the type of the anaesthetic agent used is not important.

The infiltration should, of course, be repeated as often as necessary, and probably somewhat more often than they were given in case 1, where the period of relief was being studied.

It would seem that this procedure might be of value pre-operatively in cases suitable for embolectomy, to facilitate the operation under local anaesthesia, by relieving the pain, and also by lessening the ischæmia before and during the operation.

#### SUMMARY

Blockade of the lumbar sympathetic chain, by infiltration with procain solution, was found to give prompt and complete relief of otherwise intractable pain in two cases of embolism of the lower extremities.

The method is recommended for trial in cases of embolism, either alone or in combination with embolectomy, and should also be considered in the management of wounds of the major arteries, and of arterial thrombosis and acute thrombophlebitis.

The author wishes to thank Dr. George Hale, and Dr. Frank Kennedy, of the Department of Medicine, the University of Western Ontario, for their co-operation in connection with the cases described, and for their permission to publish the case reports.

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## A CASE OF PSITTACOSIS\*

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PSITTACOSIS is primarily an infectious disease of tropical birds of the parrot family. It is readily transferable to man, with an incubation period of 10 to 14 days, and characterized by chills, high fever, severe headache, anorexia and bronchopneumonia. The mortality rate is variable, and in some series has been as high as 35 per cent. Prior to the outbreaks of psittacosis in 1929-30 in Europe and America, the etiological agent was thought to be Nogard's bacillus. But in 1930 it was established almost simultaneously in England and in the United States that the etiological factor was a filter-passing virus.

Unless it occurs in epidemic proportions the disease is difficult to diagnose on clinical findings alone. When suspected it can be definitely confirmed by sputum inoculation into mice, with a resultant typical pathological picture, and also by complement fixation tests on whole blood.

Psittacosis is presumed to be a rare disease in this country but there is a possibility that its incidence is greater than has hitherto been believed. The literature shows no Canadian cases in which the clinical signs have been confirmed by laboratory findings. With this in mind the reporting of a proved case would appear to be of interest.

The case in question is that of a graduate nurse who for twelve days nursed a housewife who was reported to have had an atypical pneumonia and persistent fever. This patient had been sick for four weeks before obtaining the services of the nurse. The latter went off the case after twelve days, and three days later first noticed the onset of symptoms. She had inspected some budgerigars at a distance of about three feet, this being five days before she felt ill. Two days prior to her leaving the case a second member of the family became ill with symptoms comparable to the first. This person was the husband of the woman first affected. He has as a hobby a large aviary of budgerigars, about one hundred in number. Shortly after the onset of his illness a third member of the family

took ill. All the patients mentioned recovered.

Budgerigars represent a species of Australian parakeet which is particularly susceptible to psittacosis. Many of the birds of the aviary had been imported from England, while the others had been bred by the owner. The parakeets, on inspection, now appear to be quite healthy, but it has been established experimentally that apparently well birds can harbour the virus for some months without giving clinical evidence that such is present. It is possible, therefore, that the occasional death in this collection has been due to psittacosis.

In giving the clinical account of this case, comparison is made with the classical description of Sturdee and Scott in their series of some 80 London cases in the epidemic of 1929-30.\*

The incubation period in this case cannot be definitely established because the source of contact remains uncertain. The patient at no time actually handled the birds, but five days prior to the onset of the *fastigium* she approached within three feet of the cage. Authorities believe that this distance lies within the range of infectivity from virus-laden dust from infected birds. However, it is improbable that the disease was contracted at this time, in that the incubation period is rarely less than ten days. The shortest proved incubation period in the English cases was six days. Only on one other occasion, twelve days prior to the onset of symptoms, did the patient visit the room in which were housed the budgerigars. At this time she did not approach the cage. It is possible that human transmission may have occurred in this case, although such is rare; also, fomites could have played a part, for isolation technique was not strictly adhered to.

The onset of the invasion period was typical. It commenced three days after the nurse came off the case, namely, October 26, 1940. She experienced general weakness, vague pains in the limbs, anorexia, and a sensation of malaise and feverishness, interrupted by occasional chills. The weakness increased to profound exhaustion,

\* From the Medical Service of St. Michael's Hospital, Toronto.

\* Bulletin of Ministry of Health on Psittacosis by Sturdee and Scott.

drowsiness and mental depression. The patient had slight epistaxis on two or three occasions. Severe headache was present from the beginning, attaining its maximum intensity in ten days, then gradually diminishing. This is one of the most constant findings in the classical picture. Chills and rigors were a feature of the onset, as is usually the case.

Generalized aches and pains, as in influenza, constituted one of the earliest symptoms. While pain in the chest is rarely noted, in this case it was a striking feature. It appeared on the tenth day of illness as a steady pain in the left chest, unaffected by respirations. It gradually decreased in severity during the subsequent two weeks.

### CASE REPORT

The patient, a fifty-five year old woman, was admitted to St. Michael's Hospital, Toronto, on her ninth day of illness, with the following signs: (1) A pyrexia of  $104^{\circ}$ , a respiratory rate of 32, and a pulse rate of 110. She then did not appear to be as ill as her fever would suggest. (2) The patient was apparently suffering from an acute infectious process not typical of pneumonia, typhoid or influenza. (3) A slight paroxysmal cough was present, which became somewhat productive three days after admission. The sputum was very scanty, thin and white, not mucoid or rusty. (4) The pyrexia was fairly typical of the disease as described by the English writers. It rose to  $103^{\circ}$  on the third day of illness and remained above this level, with only one exception, for seven days; the highest peak being  $104.2^{\circ}$ . The temperature chart demonstrated broad peaks and gradual undulations, with defervescence on the twelfth day, commencing by lysis. But for another week the temperature frequently swung up to  $101^{\circ}$ . (5) Chest examination revealed no abnormal physical signs until eight days after the onset. Then there appeared evidence of pneumonic consolidation of the left upper lobe, with moist crackling râles, slight dullness over the area and broncho-vesicular breath sounds. The absence of true respiratory distress was particularly noticeable. This is a valuable differential diagnostic point in psittacosis, in contrast to other forms of pneumonia.

The convalescence was long, the patient feeling very weak and suffering occasional pain in the left chest, aggravated by movement. All chest signs cleared with the exception of a few scattered râles which have persisted. In keeping with the prolonged pyrexia, desquamation of the hands was noted, together with slight transitory alopecia.

**Laboratory investigation.—Urinalysis.**—For the first three days of hospitalization the urine was scanty and showed a moderate albuminuria.

**Blood counts.**—On the day of admission to hospital the hgb. estimation was 90 per cent and the white cell count 9,000. Three days later the white cell count was 11,000.

**Typing of sputum.**—Very few pneumococci were found and no fixed type was demonstrable. No tubercle bacilli were present.

**Repeated complement fixation tests for *B. typhosus*, *B. paratyphosus* A and B, and *Br. abortus*** were all negative.

**Blood culture** was sterile.

Psittacosis being suspected, contact was made with the Provincial Laboratories, following which specimens

of sputum and whole blood were sent forward for examination. The Laboratory reported that typical pathological changes resulted from the inoculation of the sputum into mice. The complement fixation test was found to be positive for psittacosis.

**X-ray films of the chest.**—In the right lung were numerous parenchymal calcifications.

The left lung showed numerous scattered old calcifications in the region of the first interspace. But there was also a hazy reaction in the parenchyma, extending from the first rib downwards to the second interspace, with a similar appearance opposite the fourth rib anteriorly. This would appear to be suggestive of fine fibrosis of tuberculous nature.

**Treatment.**—This took the form of the usual pneumonia routine, but was supplemented with sulfapyridine per os, in the following dosage, which was commenced on the fourth day of illness. Sulfapyridine—g. 0.5 q. 1 hr. x 4, then g. 0.5 q. 2 hr. x 10, then g. 0.5 q. 4 hr. for thirteen days.

The effect of the sulfapyridine is difficult to assess. It would appear to be of only slight, if any, benefit in the treatment of this infection.

### COMMENTS

1. Psittacosis is possibly more prevalent in Canada than has heretofore been suspected.

2. Owing to the involved character of the laboratory investigation, in no previous Canadian case has it been possible to establish the presence of the responsible virus.

3. An interesting character of outbreaks of psittacosis is the occurrence of "house epidemics", as in this instance when three patients exhibited a condition suggestive of psittacosis and the fourth was definitely proved to be such.

4. The clinical manifestations follow extremely closely the symptomatology as reported by Sturdee and Scott in their report on the London epidemic of 1929-1930.

5. While sulfapyridine was used in this case it was not possible to establish the value of this method of treatment.

Confirmation of the diagnosis of psittacosis in this case was made possible through the co-operation of Dr. A. L. MacNabb, Director of the Division of Laboratories of the Provincial Health Department of Ontario, and Dr. Karl F. Meyer, of Wm. Hooper Foundation, San Francisco, California.

### RÉSUMÉ

La psittacose, maladie aviaire, peut être transmise à l'homme. Elle a une incubation de 10 à 14 jours et se manifeste par des frissons, de l'hyperthermie, de la céphalée, de l'anorexie et une broncho-pneumonie. Elle est causée par un virus filtrant. Le crachat inoculé à la souris reproduit la maladie; il existe pour elle une réaction de fixation du complément qui est toujours fidèle. Trois malades ont contracté la maladie à la suite de contacts plus ou moins prolongés avec des perruches importées d'Angleterre. L'observation d'un des trois malades est rapportée en détail. La preuve de la psittacose fut faite par l'inoculation à la souris et par la réaction de fixation du complément. L'évolution fut tout à fait typique. Tous ont guéri sans que nous puissions affirmer si la sulfapyridine fut effectivement l'agent curateur.

JEAN SAUCIER.

## THE PSYCHOLOGY OF THE GENERAL PUBLIC WITH REGARD TO ACNE VULGARIS\*

BY WALLACE MARSHALL, M.D.

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ACCORDING to a recent article which appeared in a national publication for laymen there are approximately four million persons in the United States who are afflicted with acne vulgaris. Such people are often handicapped socially by the disfigurement produced by this disease. The sociological and economic complications arising from this problem are, of course, quite obvious. The study of such a problem includes the handicapped individual in his environment, and the environment, in such a case, is made up mainly of the people who come in contact with these patients.

Medical authors have taken cognizance of the omnipresence of this problem, since the literature contains sporadic writings which have to do with this subject. The explanations presented by these writers probably have been culled from their clinical observations along with material obtained from their patients. However, the existing literature does not describe the psychology of others who come in contact with patients afflicted with acne vulgaris.

Cornell<sup>1</sup> has written that:

"Acne vulgaris always has been and probably still is the most common and prevalent skin disease which the dermatologist is called upon to treat. It is the easiest to diagnose, also one of the least serious so far as general health or life is concerned. However, from a social and economical point of view, I believe it to be about the most important skin disease for us to consider. It generally appears in young people at a time when they are most conscious of their appearance. They will shun society and become bashful and morose. The presence of acne has kept many a bright and accomplished young person from securing a position or from carrying on some important or productive work."

Markson and Miller<sup>2</sup> have written that:

"Acne is one of the commonest of all skin diseases occurring during adolescence. The disease, while not serious from the standpoint of its pathology, is of great importance to the young patient from the cosmetic and mental angles. Coming on at that period of life, these young persons suffer from a peculiar state of mind which may be styled as an inferiority complex, the degree of which depends on the duration and severity of the acne. Such persons regard them-

selves as outcasts; they shun society and feel as if they had been branded as unclean. They stay at home for days at a time, and we know of cases in which patients even gave up college."

In order to determine the attitude of employers toward such handicapped patients a questionnaire was sent to forty well-known firms. These were composed of hotels, department stores, and restaurants. The questionnaire asked that the managers of the personnel bureaus state their policy with regard to the employment of such patients. In other words, did they consider employing a patient with acne, and if not, why not? They were assured that all information received would be handled in a confidential and professional manner; no names would be quoted at any time. The results of this method, were:

Questionnaires to:	Number mailed	Number replied
(a) Hotels	8	0
(b) Department stores (large)	8	3
(c) Department stores (small)	8	0
(d) Restaurants (large)	8	0
(e) Restaurants (small)	8	0

Only three department store personnel bureau heads answered, and no positive information was made available. Two of these eastern firms stated that they were unable to give out any information. The other reply, from a large mid-western department store, stated that, "it was difficult to answer your questions as so much depends upon the position to be filled. We try to consider each individual's qualifications with respect to the kinds of jobs he can fill, and to give any generalized opinion as to our attitude toward specific characteristics of applicants as applied to jobs in general would be misleading."

In order to obtain the desired information, personal interviews were arranged and obtained with certain executives of large concerns. These persons have to do with the hiring of the personnel of their organizations. Five such executives were interviewed personally, and each interview was most satisfactory. Three of those interviewed were females. Two were males.

\*From the Department of Dermatology and Syphilology, Northwestern University Medical School, Chicago, Ill. Written under the supervision of Prof. Emeritus Arthur W. Stillman, M.D., former Chairman of the Department.



The specific points mentioned with regard to employees with aene vulgaris were:

One executive (female) asked if this skin disease was caused by a bad general physical condition; if it was, did it interfere with the working efficiency of that individual? Another executive (female) asked if the condition was caused by any social disease.

Three employers (one male and two females) volunteered that this skin disease makes customers "squeamish" when such persons wait on customers who resent people with "messy appearances". One woman, with great secrecy, asserted that such male persons are prey for questionable practices. When asked to explain this, she volunteered "pansies". This proves that the old slanderous idea that aene is an evidence of irregular sexual practices is still prevalent. One male and one female executive felt that the "extreme" employer would not touch anything which the aene patient handled. They felt, with their customers, that such articles "were contaminated".

A female executive, with apparent keen observation, volunteered that she had noticed many times that girls with aene had the tendency to wear black or brown clothes, since they did not wish to attract attention to their skin. These girls did not care to wear gaudy clothes because of the red spots on their faces. Nor did they wear "cheerful colours."

All the five persons who were interviewed finally agreed that they would not be inclined to hire people with aene, nor with any other prominent skin disease, because they felt that their customers would be repelled rather than attracted to such individuals. From these interviews it appeared quite certain that aene patients are confronted with a serious economic and emotional handicap brought about, at least in part, by the attitudes and reactions of persons about them.

In order to determine the nature of the personalities of our aene patients, psychiatric interviews were held before active measures were

TABLE I.  
NUMBER OF ACNE PATIENTS INTERVIEWED, 15 (ALL UNMARRIED).  
NUMBER OF MALES, 5. NUMBER OF FEMALES, 10.

Patient	Age	Sex	Psychological Implications														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	25	M.	Yes	Many	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
B	18	M.	Yes	Many	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes
C	20	M.	Yes	Many	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
D	15	M.	No	About two	Yes	Yes	No	No	Yes	No	Yes	Yes	No	No	No	No	Yes
E	17	M.	No	A few	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes
F	11	F.	No	Seven	Yes	Yes	Yes	No	Yes	Yes	..	Yes	No	No	No	No	Yes
G	14	F.	No	...	Yes	Yes	Yes	No	Yes	Yes	..	Yes	No	No	No	Yes	No
H	18	F.	Yes	Many	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes
I	17	F.	No	Many	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes
J	21	F.	Yes	Many	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes
K	20	F.	Yes	Many	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes
L	16	F.	No	Few	Yes	Yes	No	No	Yes	Yes	..	Yes	No	No	No	No	Yes
M	19	F.	No	Few	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No	No	No	Yes
N	29	F.	Yes	Many	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
O	20	F.	Yes	A few	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes

CODE TO "PSYCHOLOGICAL IMPLICATIONS"

1. Have you ever consulted a physician for your complexion?
2. How many separate salves or lotions have you tried?
3. Do you like pets, i.e., dogs, cats?
4. Do you think that people look at you more than they do others?
5. Do you prefer to remain at home rather than tend to mix with people?
6. Do you date much?
7. Do you "pick" your face? [Dermatolithiasis<sup>3</sup>]
8. Are you happy?
9. If not, is it because of your complexion?
10. Do people often call attention to your complexion?
11. Do you work at least part time at present?
12. Have you ever been denied a position because of your complexion?
13. Have you ever thought of "ending it all"?
14. Do you like to wear "gaudy colours" with regard to your clothes?
15. Are you offended easily?



arrive at a workable standard concerning the nature of the improvement in these cases obviously no rigid standard of measurement was available. In order to control this as adequately as was feasible, this series of fifteen cases was divided into groups of those who responded to therapy with liver extract, in contrast to those who showed no improvement during the three months which formed the period of observation.

"Improved" patients were those who showed definitely a retardation and at least a partial obliteration of their primary lesions, which included macules, papules, pustules, and comedones. In order that a patient could qualify for the "improved" group, he or she had to volunteer that definite improvement was present. In other words, the objective signs of improvement had to be verified mainly by volunteered statements of subjective import by the patient. This qualification as to subjective improvement was appended because, if the patient noticed improvement, psychological readjustment also was taking place. After this readjustment had

reached a plateau, then overt signs and symptoms could be noticed because of the resultant changes in the patients' mental attitude. Some psychological conferences, with such patients, bore out this assumption. The psychological adjustments were quite marked in some of these improved cases. Perhaps the major personality changes showed themselves in the behaviour of the patients, who, at first retiring and asocial, became rather the opposite. A few of the younger patients became quite noisy and boisterous. The older patients began to re-enter group activities and appeared to have been able to conquer the old fear of having persons single them out in a gathering. Two of the patients married. They were not engaged when they first reported for treatment. All patients now working have had compliments from their friends with regard to the improvement in their complexions. This, perhaps, has done more than any other factor to re-establish their morale.

*Psychology of patients with acne.*—The psychological literature is full of various hypotheses which attempt to explain behaviour on the basis of "drives" or motivations. After reviewing these theories very carefully, the author has been unable to obtain much satisfaction in the way of positive knowledge, nor has he obtained much of a coherent idea as to how these motives originate. The current behaviouristic concept of functioning reflex arcs in the central nervous system, which is used to explain complex behaviour, is not a particularly coherent ideology when it is applied to clinical phenomena. Nor does the Freudian doctrine convey much in the way of positive concepts without accepting much on the dogmas of this school. Unwieldy as it is, many clinicians do not willingly condemn it, since many of its points seem practical clinically, although the entire theory is most complex and, to me at least, does not lend itself adequately to a clear-cut study of the normal phases of psychology in contrast to the psychopathological phases of human behaviour. This has been my personal belief which I have recorded from time to time.<sup>7, 8, 9, 20</sup>

In order to evolve an understandable psychology which can be of immediate use to clinicians in the medical field I have constructed an approach to this subject which makes use of the principles found in the allergic field.<sup>10, 11</sup> Although the term "allergy" is somewhat misleading, due to the current loose implications which

TABLE II.

IMPROVEMENT CHART  
(Subjective and objective symptoms and signs)  
(Within 3 months)

Patient	Age	Sex	Personality changes
A	25	M.	Obtained a very good position, doing well, married.
B	18	M.	Has no trouble meeting people. Enjoys company.
C	20	M.	It is noticed that patient likes "loud ties". Appears happy.
E	17	M.	Is not so retiring. Noticed on street quite a bit chatting with friends.
F	11	F.	Seems to be having a generally good time.
G	14	F.	Very boisterous; smashed her father's car; full of "pep".
H	18	F.	Married and appears very happy.
I	17	F.	States that she has found a boy friend. Likes to dance.
J	21	F.	Went on a long trip with her friends this summer.
K	20	F.	Seems happy. Has become a scout master.
L	16	F.	Has always seemed happy. Very easy-going.
O	20	F.	States that she likes to swim. Goes on picnics. Seems to have made a good adjustment.

UNIMPROVED

Patient	Age	Sex	Personality changes
D	15	M.	} No changes noted. Patient has become very bitter. Does not wish to continue therapy.
M	19	F.	
N	29	F.	

it has suffered, the concept which I employ perhaps can best be described through a related term, immunology.

For the purpose of discussion this mammoth topic is divided into a dichotomy. We speak of two major components, the patient and his environment. The individual perceives the nature of his environment through the powers of perception, of which there are five, namely, seeing, hearing, smelling, tasting, and feeling. The perceptive impulses, which reach the patient's cerebral cortex through the patent afferent channels or sensory pathways, are regarded as psychoallergens, or psychoimmunogens, in that these perceptive impulses, when present in over-abundant amounts, may oversensitize the individual's cortical cells, which apparently possess the power of recognition and retention, which we regard as memory.<sup>12</sup>

If excessive amounts of afferent stimuli (psychoimmunogens or psychoallergens) are conducted to these related depots of perception (cortical cells), then the patient tends to show psychopathological reactions because of this hypersensitized state. Such reactions are well-known to clinicians, who regard such states as being of a hyper-emotional nature. Our hypothesis explains this shunting of these discharges to the autonomic nervous components in the following manner. Just as the hypersensitized patient who is overcome by excessive stimuli, originating by overstimulation due to a super-abundance of pollen or other allergens, so the individual with excessive afferent stimuli has hyper-sensitized cortical cells which pass their excessive efferent neuronal discharges to the autonomic nervous system. Thus, the well-known defensive reactions are noted in such hypersensitized persons; this hyper-reaction occurs in any condition when an individual is overcome by excessive afferent stimulation caused by over-abundant amounts of pollens, perceptual stimuli, or over-abundant stimuli of any nature whatsoever.

With the above hypothesis in mind, the defensive tactics of the patient with acne become obvious, since he is overcome by the omnipresence of these perceptive overstimulations which come about as the result of that which the many persons say and do with regard to his physical

condition. The adjustment, namely, withdrawal from society, which the acne patient shows, is a self-induced reaction, and is correlated with the withdrawal of the over-sensitized allergic patient from his immediate environment; he goes to the mountains to rid himself of his asthma or hay-fever. There, no allergens are present to irritate his hyperallergic state. Accordingly, if the hypersensitized acne patient withdraws from society, he, too, obtains freedom from having his attention called to his complexion, which has produced a psycho-hypersensitized state because of these excessive perceptual stimulations which have originated from those about him through his perceptive powers. Thus, this withdrawal from reality is a self-induced reaction motivated by a desire for self-preservation, particularly of personality.

*Effects of improvement on psychological reactions of patient.*—Partial removal of the disfiguring eruption tends to re-establish self-confidence in these patients, because the attention of the patient is not called so much to his disorder. In other words, such an individual does not find it so necessary to cope with a disagreeable environment. To put it another way, fewer psychoimmunogens bombard his already super-saturated cortical cells, which heretofore have had to deal with such noxious stimuli which have irritated his already hypersensitive cortical cells. This respite allows, apparently, a more tranquil state to ensue, and the patient is able to at least partially recuperate from his past painful experiences. This readjustment is usually satisfactory for the re-establishment of a more normal psychic state. However, some of these patients have overcompensated for their psychic upsets, for they have become obstreperous and quite over-enthused as the result of their clinical improvement.

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## TUMOURS IN MONOZYGOUS AND DIZYGOUUS TWINS\*

(A REPORT OF NINETEEN NEW CASES)

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SOME time ago, I made an appeal in various medical journals, for instances of tumours in twins. To that appeal I had a number of answers. Some of them were of cases which had already been published; others were of conditions which were not strictly neoplastic; others were of true tumours in twins. Because of the apparent rarity of tumours in twins, less than a hundred reports having been published so far as I can ascertain, I am putting on record the following cases with the permission of the physicians who sent in the data.

## MONOZYGOUS TWINS: BOTH AFFECTED

## CASE 1

R.W., a boy, aged 14 years, in 1934 had a medulloblastoma of the cerebellum removed which had been histologically diagnosed. Radiation was given and the patient is still alive and well.

W., the twin of R.W., was so much like his brother that they could not be distinguished except with difficulty. He had a sarcoma of the left scapula at the age of 14 years in 1934. The diagnosis was confirmed by a biopsy specimen. The tumour was treated by radiation and the boy is alive and well in 1939.

## CASE 2

R.L., a girl, aged 7 months, was brought to the clinic by her mother because of poor vision and abnormal eyes, both of which were buphthalmic. Vitreous hemorrhages were present in both eyes so that the retina could be seen only indistinctly, but it was thought that bilateral retinal detachment was present. The right eye was trephined. The mother stated that the child had a twin sister and was asked to bring the twin to the clinic the following week. Ten months later, the trephined eye had to be enucleated because of retinoblastoma, from which the child died two months later.

E.L., the twin sister of R.L., at 7 months showed extensive bilateral retinal detachment with occasional minute hemorrhages on the detached retina. The eyes were normal in size at that time, September, 1937, but soon became buphthalmic. Two months after her twin sister had developed retinoblastoma E.L. developed it also and died several months after her twin sister. They were identical twins.

## CASE 3

Mrs. F.McC.B., aged 48, had benign tumours of the right breast and later of the left. The nodule in the right breast was present from the age of 40 to 46, at which time it was removed. The whole left breast

had been amputated for benign tumours when she was 41. She was alive in 1939, aged 48, but has pulmonary tuberculosis and a fibroid uterus.

Her twin sister had benign tumours of both breasts, which have been removed. She is alive and well. The twins resembled each other so much that their friends could not tell them apart.

## CASE 4

Mrs. H.J.W., aged 47, had a carcinoma of the stomach and was operated on. The diagnosis was verified by histological examination; she died of pulmonary metastases at 49.

Mrs. R.T.M., was the identical twin of Mrs. H.J.W. This fact was established not only through their extreme resemblance but on the statement of the physician who delivered the mother at the birth of the twins as to the condition of the membranes. A gastric carcinoma developed one month after her twin's first symptoms and she died six weeks after her twin. In both, the first symptoms were those of pernicious anemia. She died of pulmonary metastases, the original tumour having been removed and the diagnosis verified histologically.

## CASE 5

Mrs. H., aged 51, first noticed lumps in the upper and outer quadrant of the left breast in December, 1936. She was first seen by a surgeon in March, 1938, at which time a radical mastectomy was performed. The tumour was diagnosed histologically as a spheroidal-cell carcinoma of the breast. There were no axillary metastases.

Mrs. C., aged 51, her twin, had first noticed lumps in her right breast in 1933, and was treated by a quack. At the time her sister was operated on she consulted the same surgeon and a radical mastectomy was done. The tumour was diagnosed histologically as spheroidal-cell carcinoma of the breast. The axillary glands were involved in her case. The twins could be distinguished only with great difficulty.

## CASE 6

Mrs. J.R. had a cervical polyp at the age of 40. It was removed at 41 and she is alive and well at 42. Histological examination of the tumour was not done. She has been suffering from some glandular disturbance, with urticaria, which has been responding to treatment with theelin.

Miss J.McR., identical twin sister of Mrs. J.R., had a cervical polyp when she was almost 40; this was removed immediately and she is alive and well at 42. Pathological examination of the tumour was not done. She had had a toxic goitre which had been removed several years before.

Both twins, as well as two other sisters, suffer from an anemia, which gives a blood picture of secondary anemia, but which responds to treatment with liver, the latter being essential to keep the hemoglobin level up to normal.

## MONOZYGOUS TWINS: ONE AFFECTED

## CASE 7

T.S., a baby girl, aged 8 months, had swelling of the jaw first noted in December, 1936. Seven months later a pathological diagnosis of fibrosarcoma of the

\* Read before the Seventh International Congress of Genetics, Edinburgh, Scotland, August 25, 1939; and before the Third International Cancer Congress, Atlantic City, September 11, 1939.

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jaw was made. She was treated and is alive and well at the age of 3 years.

L.S., the identical twin sister of T.S., has had no evidence of any tumour and is alive and well at 3 years.

#### CASE 8

Mrs. A.K., aged 59, has five children. She suffers from essential hypertension, her pressure being 230/130. At 51 she had hemorrhoids and an anal fissure for which she was treated. At 57 she complained of a recurrence of this condition and on examination was found to have carcinoma of the rectum. All operative treatment was refused and she is now in the terminal stages of the disease. A consulting surgeon confirmed the diagnosis of rectal cancer.

Mrs. M.S., aged 59, the twin sister of Mrs. A.K. has one child. She has essential hypertension, her blood pressure varying between 220/120 and 240/130. She has persistent bradycardia, with a pulse rate of from 45 to 50, while that of her twin is from 60 to 70. She too has had hemorrhoids which were surgically treated, but at the age of 59 has no sign of a rectal cancer.

#### CASE 9

D.K., aged 28, noticed a pimple on his arm in 1936. He picked at this, and a lump appeared. This was removed twice and then lumps began appearing on various parts of his body. The histological diagnosis was non-pigmented melanotic sarcoma, of which he died in 1937.

His identical twin brother is alive and well in 1939, with no evidence of any similar lesion.

### DIZYGOS TWINS: BOTH AFFECTED

#### CASE 10

M.H., a woman born in 1894, complained of menorrhagia in 1929. Masses attached to the uterus were palpated, and at operation, in which a supravaginal hysterectomy was performed, multiple fibroids of the uterus were found, two of them measuring 6 by 5 cm. The histological diagnosis was leiomyomata of the uterus and benign hyperplasia of the endometrium.

L.H., the twin sister of M.H., March, 1933, complained of menorrhagia which had lasted for five months. A large impacted mass was felt in the cul-de-sac of Douglas. A supravaginal hysterectomy was done, the mass together with the fundus of the uterus measuring 9 by 8 by 4 cm. The histological diagnosis was the same as in the case of the twin sister, plus fibrosis of the uterus. These women were distinct in type and could be easily told apart.

#### CASE 11

P.F., a man aged 66, had a history of a sore on the lower lip for six months and swelling of the lower jaw for two months. The two lesions were quite distinct and separate. The histological diagnosis at that time, February, 1938, was carcinoma of the lip and carcinoma of the lower jaw. He died in November, 1938.

T.F., the twin brother of P.F., came in September, 1937, with a history of pain in the ear for two months. He died in January, 1939, of carcinoma of the tongue, fauces, soft palate, and the posterior end of the alveolus of the left jaw. The diagnosis was confirmed by histological section. Although the patients were similar in appearance it was quite easy to distinguish between the two.

### DIZYGOS TWINS: ONE AFFECTED

#### CASE 12

W.G. began to have cerebral symptoms in 1932 and was operated on in 1937, at which time an oligodendroglioma was removed from the brain. He is now alive and well.

M.G., the twin sister of W.G., is alive and well in 1939, with no signs of tumour.

#### CASE 13

B.F., a boy aged 11 months, had cerebral symptoms which were thought to be due to a medulloblastoma. He was not operated on but was treated with x-rays, which gave great relief. He is alive and well at the age of 6 years.

J.F., the twin brother of B.F., is alive and well at 6 years with no signs of tumour. The twins are most unlike in their appearance and in their dispositions.

#### CASE 14

J.B.G., a man aged 63, died of carcinoma of the stomach, which diagnosis was confirmed at autopsy.

L.F.G., the twin brother to J.B.G., died at the age of 60 of what was thought to be chronic nephritis. There was no autopsy but there were no symptoms of gastric cancer. The twins did not resemble each other to any extent.

#### CASE 15

These twins were the sons of J.B.G. (case 14), A.A.G. was 46 when gastric carcinoma developed. At 47 a subtotal gastrectomy was performed, and the patient is alive and well at 52. The diagnosis was confirmed histologically.

E.G., the twin brother to A.A.G., now 52 and in good health, has no signs of gastric cancer. The twins are most unlike physically and mentally.

#### CASE 16

Mrs. S. died at the age of 44 of carcinoma of the middle ear, which diagnosis was confirmed by histological section at autopsy.

Her twin sister, most unlike her, is alive and well at the age of 59, with no evidence of any tumour.

#### CASE 17

Mrs. E.C.A. in 1935 had a cancer of the rectum for which she was operated on. Three years later she had the ovaries and uterus removed, but I have not been able to ascertain whether this was for a primary growth, or for a secondary extension from the old rectal cancer, or for some other therapeutic purpose. In July, 1939, signs of a growth developed in the lung and later cerebral metastases appeared. She died in November, 1939. The radiologist to whom I am indebted for the note on the results of the radiological examination stated that from the history and from the appearance of the x-ray films he felt confident that the growth in the lungs was a secondary one.

Mrs. M.C., the twin sister of Mrs. E.C.A., is alive and well in 1940, five years after the onset of her twin's cancer. They were most unlike in their physical appearance, so that there can be little doubt that they were dizygous twins.

#### CASE 18

M.S., a girl aged three years, had a reticular cell tumour of the left maxilla and cheek and died at the age of 3½. There was pathological confirmation of the diagnosis.

M.S., the twin sister to M.S., is alive in 1940 at the age of 4½ years, with no evidence of a tumour. They were most unlike in their physical appearance and therefore obviously dizygous twins.

#### CASE 19

Female twins of the dizygous type were born in July, 1930. Twin A developed hypernephroma, which was diagnosed February, 1939, and removed May, 1939. The diagnosis was confirmed histologically. Twin B is alive and well in 1940, with no sign of a tumour.

## COMMENT

It will be noted that these foregoing instances of tumours in twins bring out several important facts. Both twins were affected in a higher percentage of cases in the monozygous series than in the dizygous (66.6 and 20 per cent, respectively). Moreover, they were affected with the same type of tumour in a greater percentage of cases than was true in the dizygous twins (55 and 20 per cent respectively). They were also affected at more nearly the same age than was the case with the dizygous twins. The average difference in age of onset was 7 and 24 months respectively. In the cases in which the age of onset was given it was the same in four instances, and differed by three years in the fifth in the monozygous twins, while in the dizygous the onset was the same in one case and differed by four years in the second.

When one twin only was affected the time during which the second twin had remained free was much longer in the case of the dizygous twins than in the case of the monozygous. This shows that, for the most part, if one waits long enough in the case of monozygous twins before making the report the second twin is liable to become affected, and thus the case would be shifted over into the category of *both twins affected*. Thus the average time during which the second twin had remained free of the tumour in the monozygous twins was two years and one month. In the dizygous twins the average time during which the second twin had remained free was six years.

The analysis of the similarities between these monozygous twins and those reported in the literature, and between these dizygous twins and those recorded in the literature shows that this smaller series confirms the observations made of the larger series of cases. I have been able to find reports of 53 pairs of monozygous twins and of 35 pairs of dizygous twins of which one or both were affected. To these I have added two other published cases of my own, and these together with the 19 here recorded make a total

of 109 pairs of twins with tumours of which I have records. Sixty-three of these are monozygous and forty-six are dizygous. The analysis of the total series<sup>1</sup> indicates that monozygous twins, in which the heredity is as near identical as it can be in two human beings, resemble each other much more closely than do dizygous twins, in which the *total* heredity is dissimilar, although it may be similar in some respects. This would point to heredity as being one of the major factors in the determination of the site, the type, and the age of onset of tumours.

I shall be glad to receive further cases of tumours in twins with data as to whether one or both twins are affected, type of tumour, age of onset, and type of twins. The *Canadian Medical Association Journal*, the *British Medical Journal*, the *Journal of the American Medical Association* and *The Lancet* published my appeal for cases of tumours in twins. Dr. L. M. Davidoff, of the Jewish Hospital, Brooklyn, sent in data for case 1; Dr. W. J. Duncan, of Melbourne, Australia, for case 2; Dr. F. B. Robinson, Oxford, Pa., for case 3; Dr. G. L. Rohdenburg, New York, for case 4; Mr. A. K. Wilson, of the Royal Liverpool United Hospital, Liverpool, England, for case 5; Dr. E. W. Nicklas, Washington, D.C., for case 6; Dr. H. W. Jacox, of the Western Pennsylvania Hospital, Pittsburgh, Pa., for case 7; Dr. L. I. Johnston, Carlisle, England, for case 8; Dr. William Steinberg, Philadelphia, Pa., for case 9; Dr. M. H. V. Cameron, Toronto, Canada, for case 10; Dr. A. A. D. LaTouche, of the General Infirmary of Leeds, England, for case 11; Mr. W. G., who is the patient for Case 12, and Dr. K. G. McKenzie, Toronto, Canada, who gave the pathological diagnosis; Dr. G. I. Dawson, Napa, Calif., for case 13; Dr. P. L. Gray, South Brooksville, Me., for cases 14 and 15; Dr. R. H. J. Swan, London, England, for case 16; Dr. C. M. Gray, Tampa, Fla., for case 17; Dr. Louis Judelson, Buffalo, for case 18, and Dr. Jane B. Armstrong, Northampton, Mass., for case 19.

Dr. I. I. Kaplan, New York, and Dr. W. L. Benedict, Rochester, Minn., called the author's attention to their published cases of tumours in twins, Dr. John Aikman, Rochester, N.Y., referred her to the published case of Drs. Allen and Manjos; Dr. H. G. Bell, San Francisco, reported his case of pyloric stenosis in twins; Dr. J. B. Jobin, of the Hotel Dieu, Quebec, sent her his record of toxic goitre in twins, and Dr. H. W. Jacox included his report on Hodgkin's disease in twins. Dr. C. C. Macklin gave the author opportunities of continuing her genetic studies in his laboratory. To all these, the author expresses her deep appreciation.

## REFERENCES

1. MACKLIN, M. T.: Analysis of tumours in monozygous and dizygous twins recorded in the literature, together with a report of nineteen unpublished cases. *J. Heredity*, 1940, 31: 277.
2. MACKLIN, M. T.: Tumours in twins (correspondence). *J. Am. M. Ass.*, 1939, 112: 1620.

... Ships, guns, aeroplanes and every conceivable kind of armament . . . these munitions are not produced by unattended machines. At the machines stand hosts of men and women, and the health of those people is a matter of crucial importance. If they are unwell, the production of armaments will flag and

halt, but if they are physically and mentally in trim, then the flow of that production will increase steadily until it becomes a flood which overwhelms the Nazi forces. . . . I repeat that the people's health is a factor second to none in importance in this supreme hour of the nation's destiny."—Rt. Hon. Malcolm MacDonald, October 17, 1940, in House of Commons.

## Case Report

### NON-TRAUMATIC PERFORATION OF THE COMMON BILE DUCT

By H. N. TAUBE, M.D. AND H. A. HIMEL, M.D.

Toronto

Non-traumatic perforation of the common bile duct appears to be an exceedingly rare complication of gall-bladder disease. Only 3 reports can be found referring to this condition. Mayo Robson<sup>1</sup> reports 3 cases; Bailey<sup>2</sup> reports 1 case; and Vale and Shapiro<sup>3</sup> report 1 case in detail. We feel our case warrants reporting because of the rarity of the condition and the subsequent complications.

A 30-year old, married, nulliparous woman had had mild attacks of colicky pain in the upper abdomen for the previous three years. The pain radiated to the right side, back, and interscapular region, and was associated with belching, bloating and nausea. No relief was obtained with food or soda. The attacks came at irregular intervals of months, would last one to three hours, and were never severe enough to require a hypodermic. She was never jaundiced, nor was there any change in the colour of her stools or urine. There was intolerance to fried and greasy food, resulting in a retrosternal burning sensation, which was relieved by soda. X-ray of the gall bladder was not done, although advised by her physician. In April and May, 1940, she experienced two attacks of right upper quadrant pain of such severity as to require morphine. It is of interest to note that her mother and brother both had had cholecystitis and cholelithiasis.

On June 3, 1940, the patient was seized with a severe attack of upper abdominal pain radiating to the back and right lower quadrant. The pain was of such intensity that a hypodermic of morphine and atropine was given three times within an hour with very little relief. The patient was pale, sweating, doubled up, and crying out with pain. Temperature was 100° by mouth; pulse 90. The heart and lungs appeared normal; blood pressure 120/70. The abdomen revealed limitation of motion with increased resistance and tenderness on the right side, especially in the right upper quadrant. A most perplexing finding was the unusual amount of tenderness in the posterior lumbar region and right lower quadrant. Rectal and vaginal examinations were negative. The white blood count was 18,000; hgb. 90 per cent. A catheter sample of urine was negative.

Due to the severity and the atypical radiation of the pain it was felt that we were dealing with more than biliary colic or neuter cholecystitis, so the patient was hospitalized for observation. Two other possibilities were considered, namely, neuter cholecystitis with appendicitis or rupture of the gall bladder. That evening her white count, temperature and physical findings remained the same. The next day, June 9, 1940, her white blood count was 25,000; temperature 101.5° F., but the physical findings were unchanged. Overnight her symptoms changed. The pulse rose to 120, the abdomen was more distended, and the maximum pain and tenderness had shifted to the right lower quadrant. It was felt that surgical intervention was necessary. Dr. N. S. Shenstone examined the patient and advised operation.

Under spinal anesthesia a McBurney's incision was done and free bile found in the peritoneal cavity.

This was drained by suction, a tube inserted, and the incision closed. A right rectus gall-bladder incision was then made. On opening the peritoneum 3,000 c.c. of clear bile was drained. The peritoneum showed very little reaction and areas of fat necrosis were seen over the greater omentum. The gall bladder was thickened, distended, but not acutely inflamed, and contained numerous faceted stones. Where the common bile duct passed under the duodenum an edematous, dark brown, cystic mass about the size of a lemon was visible. Bile could be seen seeping out of this. Apparently rupture had taken place here and had become partially sealed off. The gall bladder was opened, drained, numerous cholesterol stones were removed, and another drain was inserted close to the mass mentioned. A swab from the peritoneal bile showed no growth.

For the next seven days she seemed to improve; then evidence of infection appeared. The temperature began to swing from 99 to 103°; pulse 100 to 125; the white blood count rose to 23,000. Differential count: polymorphonuclears 85 per cent; lymphocytes 15 per cent. A blood culture was negative. The respirations also increased to 30 to 40. Chest examination revealed dullness at both bases, restricted movement, and suppressed breath sounds. Fluoroscopic and x-ray examination of the chest was done on the 15th post-operative day and pneumonitis was reported. Because of the swinging temperature, the elevated white blood count, and the chest findings, it was thought that we were dealing with a subdiaphragmatic abscess with secondary pneumonia. A needle inserted in the right chest below the diaphragm gave negative results. Eight days later 20 c.c. of cloudy fluid was obtained from the same region, which on examination showed bile-stained cholesterol crystals with a moderate amount of pus cells. Culture of this fluid revealed *B. aerogenes* and hemolytic *Staph. aureus*. Twenty-three days after her operation she was given 60 grains of daganan for 3 days; her blood daganan was 8. Because of severe nausea and no change in the clinical picture the daganan was discontinued.

As all the evidence pointed to a pus pocket, either under the diaphragm or in the region of the mass where the rupture had taken place, the patient was operated upon 29 days after her initial operation. A kidney-type of incision on the right side was made and a hard indurated mass was felt anterior to the kidney in the region of the head of the pancreas. A needle was inserted and a small piece of slough was aspirated. An incision was then made into the mass, and the slough-like material having a fecal odour was exposed. A Penrose and hard rubber tube were inserted and the incision was closed. All this was retroperitoneal. The pathologist reported a necrotic and purulent material with hemorrhagic fat necrosis (he would not commit himself that it was pancreatic tissue). Culture of the material revealed *B. coli*.

Drainage was good and the patient showed evidence of slow recovery, with gradually falling temperature and white blood count. Two weeks after the second operation the hard rubber tube was removed. Six hours later the patient had a well formed bowel movement through the incision. Apparently the hard tube must have become fixed against the peritoneum and large bowel, and on removing the tube a rent in the bowel must have been made, forming a fecal fistula. Despite this, the patient made a slow recovery. The temperature and white blood count came down, the fistula closed off, and the patient left the hospital 33 days after the second operation with a little purulent discharge from the incision. At the time of her discharge pancreatic function apparently was normal as determined by carbohydrate function and stool examination.



## SUMMARY

A case is reported of chronic cholecystitis and cholelithiasis with spontaneous rupture of the common bile duct and secondary formation of pancreatic abscess with recovery. Of additional interest is a family history of a mother with an unusual gall-bladder complication, *viz.*, chole-

cystogastric fistula, and a brother of 19 with cholecystitis and cholelithiasis for which a cholecystectomy was done.

## REFERENCES

1. ROBINSON, M.: Diseases of Gall Bladder and Bile Ducts, 3rd ed., Baillière, London, pp. 335, 410, 455.
2. BAILEY, H.: Emergency Surgery, Wright, Bristol, 1930, 1: 103.
3. VALE, C. F. AND SHAPIRO, H.: Non-traumatic perforation of common bile duct, *Am. J. Surg.*, 1932, 18: 103.

## Editorial

### BLOOD TRANSFUSION

AMONG the many problems in medicine which the war has thrown into relief none has received more attention than that of blood transfusion. Its employment has sharply increased within recent years, but the conditions of active warfare have accentuated this demand enormously. It is therefore of interest to read the report of the Blood Transfusion Association of New York concerning its project for supplying plasma to England in the latter half of 1940.

The idea of shipping plasma to France and England was suggested by Dr. Scudder, the President of the Association, in June, 1940. The use of plasma was still in the experimental stage only, but it was felt that enough was known to justify an effort at quantity production in view of the emergency. Liquid rather than dried plasma was to be used, since less was known about the dried form.

The collection of the blood for plasma was begun in August, 1940, central office space being provided by the New York Academy of Medicine, and, to begin with, six leading hospitals of New York offered their services. There was necessarily the closest co-operation between the American Red Cross and the Association; this was essential in order to keep some balance between the flow of donors and the capacities of the hospitals. This was a serious problem for some time, since it was difficult to predict the number of donors, and the supply varied widely. One of the most useful bits of knowledge gained was that regarding the attitude of possible donors. There had been no means of gauging the response to appeals for mass volunteer blood donors. Opinions had varied from belief in an overwhelming response to the feeling that apprehension on the part of the

public might result in checking the volunteering. In practice, it was found that neither of these extreme expectations was realized. There were initial difficulties, but enthusiasm soon brought in larger numbers of donors, and the final conclusion was that large amounts of blood could easily be obtained on a volunteer basis. It was found to be most important that there should be intensive and continued newspaper publicity and radio appeals, although these latter were apt to be followed by unmanageably large waves of offers. One of the greatest difficulties was the necessity of having donors come to hospitals or other central places, instead of its being possible to go to them at their places of employment.

The total donations of blood were 14,556, and the total amount of plasma saline solution produced and believed to be satisfactory was about 5,500 c.c. Since the project was a volunteer one, the cost was extremely low, being calculated at about \$14.70 per litre (including capital charges for equipment) without saline. A commercial market price of \$138.00 per litre is mentioned in comparison.

The demand from England was terminated in February, and the collection of blood was then stopped. The whole project gave much valuable information, but, unfortunately, pressure of circumstances prevented the carrying out of the intensive research which is still required on the subject of transfusion with either blood, plasma, or serum. One of the most difficult of the problems in this connection is that of preservation of plasma. Preservatives are valuable, but so far none has proved to be infallible over long periods. The therapeutic values of the dried as against

the liquid form of plasma and serum have also to be worked out.

Our readers will have noticed that we have been devoting much space in recent numbers

of the *Journal* to problems connected with this subject, and we intend to present all such work as promptly as it is available.

H.E.M.

## Editorial Comments

### Psittacosis in Canada

The recent appearance of psittacosis in Toronto serves to call attention to a serious malady which, fortunately, has not often been found in Canada. Psittacosis was first described by Ritter<sup>1</sup> in 1879, in Switzerland (acquired from parrots). Since his time small outbreaks of it have occurred in almost all civilized countries. The disease, acquired this time from parakeets, first reached Canada in 1930, nine cases being reported at Vancouver, New Westminster, and Burnaby, B.C. A reference to articles by A. R. Chisholm,<sup>2</sup> J. W. McIntosh,<sup>3</sup> and Norman McL. Harris<sup>4</sup> will disclose its salient features as noted at that time. No known cases have been recorded in Canada since then until now.

Psittacosis is a disease primarily of birds of the parrot family but has also been recently detected in the United States in pigeons and chickens. It can easily be communicated to human beings. It is a rather severe malady characterized by malaise, headache, bronchopneumonia, usually constipation, but sometimes diarrhoea, and, occasionally, nephritis. The incubation period is from six to fifteen days. The mortality rate is high, about 20 per cent, and in those over fifty years of age the disease is said to be uniformly fatal. Diagnosis is not always easy. Psittacosis may be confused with atypical bronchopneumonia, atypical influenza, and, perhaps, typhoid. A history of contact with infected birds will usually settle the matter. In this issue (p. 597) Drs. D'A. J. Prendergast and W. B. Phair, of St. Michael's Hospital, Toronto, report a case, the first one in Canada to receive a complete laboratory investigation. This is only one of a number of cases occurring about the same time in Toronto, and Dr. Phair has courteously furnished us with further details about the outbreak.

"The first case in the present outbreak of human psittacosis in the Toronto district was reported early in December, 1940, from St. Michael's Hospital. Laboratory findings supported the clinical diagnosis, and serological examinations confirmed the laboratory and clinical findings. Investigation of this case resulted

in the discovery of three other suspected cases among the family of a breeder of budgerigars. The diagnosis of two of these was later definitely established by serological examination. Up to May 6, 1941, 23 confirmed cases have been established and 10 suspected cases were under investigation. One death has occurred.

"The outbreak has been traced to birds locally bred, all to date being budgerigars. While the infection among the birds may have originated in the aviary of one breeder or dealer there is every reason to believe that the stock in some three, and perhaps four, aviaries is now affected. Further, there is some evidence to show that cases of influenza-like illness and atypical pneumonia occurring during the fall and winter months among owners of psittacine birds have been unrecognized cases of human psittacosis. Rigid control measures have been implemented by the Provincial Department of Health under authority of the Public Health Act of the province."

The importance of this subject will readily be admitted.

A.G.N.

### The Illicit Traffic in Narcotics

We have before us the Report of the Narcotic Division of the Department of Pensions and National Health of Canada for the fiscal year ended March 31, 1940. It proves interesting and encouraging reading. Progress towards the ideal situation is slow but steady. Much of the improvement is due to the efficient work of the departmental officers, the Royal Canadian Mounted Police, and municipal police forces, particularly, in the last case, of Toronto, Winnipeg and Montreal. Some indication of the trend of events is seen in the fact that on the Pacific Coast a 7½ oz. tin of prepared opium cost \$52 twelve years ago while now it sells at \$500. The heroin and morphine procurable also are heavily adulterated. The number of addicts in Canada is estimated at 4,000, a reduction of 50 per cent in ten years.

Addiction to codeine is also known, and since the outbreak of the war stringent regulations have been adopted so as to control the manufacture of preparations containing this drug. Now, too, codeine in any form and preparations containing any quantity of it or any other narcotic drug can only be sold on prescription.

Paregoric, that old "stand-by" for soothing infants and a favourite source of supply for ad-

1. RITTER, J.: *Deutsches Arch. f. Klin. Med.*, 1879, 25: 53.

2. CHISHOLM, A. R.: *Canad. Pub. Health J.*, 1930, 21: 320.

3. MCINTOSH, J. W.: *Ibid.*, 1931, 22: 562.

4. HARRIS, N. McL.: *Ibid.*, 1931, 22: 557.

diets, is at last under control. Formerly, when this preparation could be sold freely over the counter as much as fifteen to twenty ounces daily were not infrequently sold to one customer. Twenty ounces contain approximately four grains of morphine and more alcohol than is found in whisky as purveyed by Government stores. In 1933 the Narcotic Division, in co-operation with the Excise Branch, ruled that no retail store could normally obtain more than 80 oz. of paregoric monthly. This resulted in a considerable drop in consumption. Upon the outbreak of war regulations were passed under the War Measures Act ordaining that paregoric could be sold to the public only on the authority of a medical prescription—a move decidedly in the right direction. The drop in sales since 1932 has been in consequence from 8,727 to 1,800 gallons.

During the year it was necessary to take proceedings against one physician for the improper sale of narcotics. A sentence of six months' imprisonment was imposed. Considering that there are about 11,000 physicians in the whole of Canada we may consider this a good showing, but our satisfaction would be complete could we boast of a clean slate. Even one case of this kind cannot fail to damage the reputation of the profession. As medical men we should in all particulars conform to the law and aid to the full the authorities who are doing splendid work in stamping out the illicit traffic in narcotic drugs.

A.G.N.

### Bulletins on Medical Economics

It will be recalled that within the last year our Association sponsored a series of articles on medical economics. These were written by Mr. Hugh H. Wolfenden, the well known authority on this subject, and appeared in our *Journal*, and later in booklet form. The articles were prepared with the greatest care and thoroughness, and should be kept for reference, but it is realized that medical economics is not a subject whose importance can be properly appreciated at once. It requires to be kept continually before the profession. With this in mind the Committee on Medical Economics has asked Mr. Wolfenden to prepare a series of bulletins on this subject, and these are to be issued for the use and guidance of senior students, interns and young practitioners.

It is hoped that these bulletins will be used as a basis for group discussions by interns of hospitals, but, judging by the quality of those that have appeared, they will be of value in crystallizing the ideas of the profession generally. The Bulletins bear the following titles: No. 1, "The Doctor's Interest in Medical Economics"; No. 2, "What is Health Insurance?"; No. 3, "Voluntary vs. Compulsory Health Insurance"; No. 4, "The Development of Health Insurance in Canada".

Copies of these and later bulletins on this subject may be obtained from the Canadian Medical Association, 184 College Street, Toronto.

H.E.M.

## Medical Economics

### The Municipal Doctor

Dr. W. E. R. Coad,  
Honorary Secretary,  
Manitoba Medical Association.

Dear Doctor Coad:

In reply to your request for a letter from me stating my opinion about the "Municipal Doctor" scheme as now constituted in the Province of Manitoba, I have endeavoured to comply with your wishes in the following lines.

The so-called "Municipal Doctor" scheme of medical practice in rural areas had its origin, I believe, in the Province of Saskatchewan, enabling legislation being passed by the Government of that Province in the year 1916. The need for such a change from the former system, the competitive system let us call it for lack of a better name, arose because of the necessity of supplying some form of medical service to thinly populated areas. The old system had proved inadequate on account of the widely scattered population and the straitened circumstances of such population, making it difficult or impossible for a local practitioner in such an area to subsist on the meagre financial return for his

services. One other probable reason for the necessity of inaugurating the municipal plan was a scarcity of available medical practitioners. At that time there was a large number of doctors serving in His Majesty's services. No doubt there was ample justification for a radical change from the old system to meet the requirements in such an emergency. Nor can one criticize the Government authorities for entering upon such a project without very much planning or without much study of the question of its practical application.

From a small beginning the scheme has now spread over a large portion of Saskatchewan and a considerable portion of the Province of Manitoba. The indications are that in the near future, unless some better plan is provided, this more or less haphazard emergency system will be adopted by a majority of the municipalities of Manitoba, I think I may say in its original form because to my knowledge very little has been done to improve on it since its inception. Nor am I aware that any of its faults or shortcomings have ever been brought to light. This then is the system of medical practice that is being brought into Manitoba, not as an emergency

measure to fill a vacancy but to replace an established system which hitherto had been adequate and more or less satisfactory to all concerned with few exceptions.

To criticize thoroughly this scheme as it functions today and to call attention to the possible trend which it may take in the future is beyond the scope of my capabilities, and cannot be covered in detail in the form of a letter, so I must confine myself to a limited outline of the shortcomings of the plan as they appear to me and my personal opinion of the possible trend in the future.

My first objection to it is that it has not been sanctioned by nor adopted by our Medical Organizations in this Province as a suitable plan for its members to participate in.

Another objection concerns the manner of its introduction to a municipality in that its limitations are not pointed out to the ratepayer. In some instances I have taken objection to the personnel of the group who have appeared on the platform as advocates and authorities on the question. I know of one garage owner who has repeatedly been called upon to speak in favour of the scheme to an audience of prospective voters. To my knowledge never have representatives of organized medical bodies in the Province been invited to be present and give their views of organized medicine when this measure has been discussed in public.

Although any system of medical practice to be successful must of necessity work in full co-operation with the existing Department of Health for their mutual benefit, I do not believe that, as obtains at the present time, the supervising and control of this "Municipal Doctor" scheme should be entirely relegated to any Department of Health.

Under the Municipal Medical Contract of today in Manitoba the patient is not provided with adequate complete medical service. In most instances all the patient is entitled to under the contract is maternity service, office visits, house visits, tooth extraction, and, I would say, not minor but minimal surgery. To this may be added of course inoculations and vaccinations. Maternity service is limited to that which can be rendered by a general practitioner without recourse to services of a specialist. This type of service which I have enumerated under various headings is the least costly of all medical services. Should the patient require surgery, x-ray hospitalization, or specialist service, he is called upon to pay for it if he can, assuming thereby in some cases an almost overwhelming financial burden.

One of the most unfair and unjust features of the municipal system in my estimation is, that should the patient be an indigent requiring surgical treatment or one of the more expensive kinds of treatment the onus of supplying such treatment is thrust on other medical men not under municipal contract to render without any

remuneration. Thus we, the non-municipal doctors, are expected to give our time, supplies, and the use of our equipment, free of charge to patients from other municipalities to whom we feel that we are under no obligation, while the municipal doctor is being paid for his services. In all instances we are also obliged to supply an abundance of free service to indigents in our own municipalities.

To borrow a term from Mr. Wolfenden, the consulting actuary for the Canadian Medical Association, I would say that the Municipal Contracts as at present instituted cannot be said to be "actuarially sound". In preparing a budget to supply the salary for a Municipal Doctor I do not think the municipal authorities take any sound basis to work on. The yearly salary figure is arrived at arbitrarily by hit or miss guesswork. There is at present no upper or lower limit to the salary figure, in spite of the fact that on one occasion our Association was given the assurance that under Department of Health control no contract would be sanctioned unless the salary provided in it was \$4,000.00 per year or over.

The Municipal Doctor is expected to provide a substitute himself in the event of his absence through illness or other emergency. He is expected to provide seven days a week, twenty-four hours' a day service. Nor is there any provision made for office hours or stated periods when he shall be free to make his house visits. There is constant dissension between him and the patient concerning the question of whether he should visit the patient at his farm residence or should the patient be transported to his office. In instances where complaints are laid against the Municipal Doctor regarding the quality or quantity of his services these complaints are aired before the local Municipal Council. This Council, composed usually of farmers, is in my estimation not qualified in any manner or means to sit in judgment and give a decision on matters of a medical nature of which they are entirely ignorant. The doctor is here placed as an employee of a Municipal Council in the same category as a weed inspector, municipal clerk, or road boss. The future trend of this system unless some change is made will undoubtedly lead to lower salaries and less equitable working conditions for the doctor. We have before us the example of the country school teacher whose salary and working conditions are, to make a comparison, lower than the average section-hand working on a railroad track. When the relief scheme was in process of inauguration in the City of Winnipeg a few years ago, it was proposed by the City authorities that they hire medical men on salaries to take care of their relief cases. This proposal met with implacable opposition by the Committee on Economics representing the Winnipeg Medical Society. Why then is there no organized opposition to a similar plan adopted by a Municipal Council in

"Development is always dynamic and never discontinuous. It is therefore impossible to separate one period of development sharply and completely from any other period of development. The fetal period is continuous with the neo-natal, the neo-natal with the pre-school, and this in turn with the school period, pubescence, adolescence and adulthood. . . ."

"The events of growth and of behaviour are ordered; they fall into temporal sequences. There may be telescoping, elision, hastening, slowing; but the events will always appear, so to speak, in a time frame, and have a durational design which can be expressed in temporal terms."

The expansion and differentiation of the biological gross patterns of behaviour in the infant are characteristic for all aspects of the personality. Generalized emotional response precedes the differentiation into specific types of emotional response that may be elicited by specific stimuli. This differentiation of emotional response initiates the infant's development from a non-social state to social responsiveness and, later, social co-operation. The total unco-ordinated muscular movements of the infant become differentiated into more and more effective co-ordinations and increasing degrees of control. The maturing cortical structures and the extensive varieties of sensory experience contribute to a characteristic intellectual progression that may be described as the development of meanings; the development of insight, or the understanding of relationships; and beyond infancy, the development of simple capacity for foresight.

Motivation, that most important factor in human behaviour, is also characterized by a process of developmental progression that follows an orderly sequence and direction. All of us are intrigued by such questions as "What is the mainspring of infant behaviour?"; "What starts the infant ticking?"; "What ensures that the infant and young child will continue to tick?"; and "What ensures the infant's gradual development into socialized, effective, self-controlled and independent maturity?" The answer most frequently given is "the human infant's inheritance of varieties of instincts", such as the instinct of self-preservation, the instinct of gregariousness, the instinct of pugnacity, the instinct of self-assertion, etc. Suffice it to say, that the "theory of inherited instincts" has not stood up under the scrutiny of scientific experimentation, and we must turn elsewhere for an explanation of what makes the new-born infant a "going concern" and how behaviour continues to be motivated. Granted the "breath of life", the answer is to be found in the psycho-biological functioning and growth of the individual.

*The primary motivations of infant behaviour.*—Infant behaviour is motivated by physiological needs and internal and external sensory experience.

Cammon,<sup>6</sup> the physiologist, has proved that physiological needs of various sorts give rise to visceral tensions that are cumulative as need increases and subside as need is satisfied. These tensions create "drives" to behaviour that tend

to satisfy the need. In the helpless, undeveloped infant the overt behaviour that results from drive is in itself inadequate to satisfy physiological needs. It is, however, adequate to secure for him the necessary ministrations of his guardians. This is particularly true because the visceral tensions not only create drive but are accompanied and reinforced by varying degrees of emotional excitement. The very hungry infant feels uncomfortable; his visceral tensions create drive that is expressed in various motor activities, including vigorous sucking movements; accompanying emotional response is expressed in crying, face-flushing, and a more and more obvious "energizing" of the total behaviour response. When fed, the picture is markedly changed. Energized motor activities cease, the infant coos and smiles, and under normal conditions falls asleep. Physiological need and the satisfying of need are thus seen to be primary motivators of infant behaviour.

Another primary factor that motivates infant behaviour is the factor of sensory experience, externally stimulated. Sensory stimuli of high intensity, such as loud noises, excessive heat, pin-pricks, are biologically "threatening". They evoke unpleasant or painful sensations and bring about a rapid emotional energizing of the infant. The infant is biologically so equipped that he responds to such stimulation automatically by avoidance movements, which in the young unco-ordinated infant are inadequate to remove him from the stimulation. Conversely, sensory experiences, externally stimulated, of mild degree of intensity, such as stroking, patting, gentle handling, cuddling, are biologically conducive to the well-being of the infant. They evoke pleasurable feelings and emotions, approaching movements toward the stimuli, and a readiness to repeat the experience. All of the above reactions are brought about by the autonomic nervous system of the infant, a system that predates in evolution the development of the cerebral cortex. In infancy, when cortical functioning is relatively undeveloped, it is this primitive autonomic system that contributes to the primary motivations of the infant. During this period it also predominantly controls infant adaptations of behaviour. The infant biologically and normally "values" sensory experience. Those sensory experiences that are pleasurable and satisfying he values highly.

*How secondary motivations are acquired.*—The developing infant's needs are ministered to by mother or nurse. He thus experiences repeatedly the satisfaction of physiological needs, the many pleasurable sensory experiences that customarily accompany adult ministrations, and the presence of mother or nurse. These three factors which occur simultaneously or sequentially in time, "condition" the infant to growing responsiveness to the ministering adult as a source of pleasurable experiences and satisfactions. Values are thus gradually attached to

someone outside-the-self. As the infant grows, develops, sleeps less, and becomes capable of more adequate muscular co-ordination, other members of the family "play" with him and encourage his social responsiveness. Such play provides the child with broadening sources of sensory pleasure and satisfaction, and in turn he values his social contacts more and more highly. At a later stage of development the still older infant spontaneously inhibits certain types of behaviour in order to ensure the continuance of social approval and responsiveness.

The important point about this orderly development of what we term socialization is that the progressive attachment of values to others, "outside-the-self", is accompanied by a progressive and spontaneous relinquishment of self or infantile values. In this way infantile motivations are overlaid as it were by acquired social motivations. With normal growth and development in other aspects of the personality, the acquired social motivations become more and more complex as time goes on and influence behaviour in more and more complex ways. In the later periods of infancy the infant "helps mother" by holding arms out for clothing; the toddler "fetches and carries", he "takes turns" with brother or sister, he shares his toys spontaneously and happily. And so on.

It should be obvious that the normal progression from infantile values and motivations to more and more mature socialized values and motivations can take place only under suitable environmental conditions. The infant or young child whose experiences with others in the social group are predominantly characterized by frustration of normal activities and interests, by repeated experiences of pain or unpleasantness, tends to withdraw from and avoid such social contacts. He is thrown back, as it were, upon his own resources. In the young infant these are pleasurable sensory experiences, among which may be included thumb-sucking, which may be self-stimulated. Maintenance of an infantile phase of growth and development in the emotional-social aspects of the developing personality is thus promoted. Regressions to an infantile phase of social-emotional development in a child who has progressed satisfactorily up to a certain point also frequently occur when for one or various reasons the child feels threatened or thwarted in his social relationships and temporarily or permanently finds refuge in known sources of pleasure and satisfaction. Such regressions are commonly accompanied by more or less temporary periods of thumb-sucking activity.

Another way in which primary motivators to behaviour become overlaid with secondary acquired ones is again determined to a considerable degree by the progressive realization of the gross end-pattern of motor behaviour. The young infant is limited by the state of development of his nervous system to generalized unco-ordi-

nated muscular movements. As his nervous system matures more and more of his muscular movements can be brought under control. The infant becomes capable of holding his head up; later he can sit up, then creep about, stand, and walk. Each of the increments of nervous maturation and differentiation is accompanied by extensions of his environmental "field of activity" and this in turn enlarges his experiential field. The supine young infant derives sensory satisfaction and pleasure predominantly from touch. Much of this tactile experience is normally related to self-stimulation. As his nervous system matures he later becomes capable of grasping, of manipulation, and, normally, between the twelfth and eighteenth months, of simple construction with objects. The extension of the environmental field of activity and the progressive degrees of muscular co-ordination and control that accompany increasing maturation of the nervous system are again factors in the infant's gradual relinquishment of self-values and the progressive attachment of values to outside-the-self experiences, objects and achievements.

The infant touches, manipulates, and constrains; he creeps and crawls, stands, and sometimes walks. The young pre-school child walks, runs, pulls and pushes objects, constructs, and carries on imitative play. For infant or pre-school child these experiences are full of satisfactions and pleasures. He learns to value his activities, his toys, and his achievements accordingly. His values are more and more related to these objects, activities, and achievements than they are to the self. Since values and motivations develop hand in hand new motivations are acquired that direct interest, attention to outside-the-self factors, and set up objectives toward which activities are co-ordinated.

The normal progression outlined above is, however, again dependent to a considerable degree upon environment and adult guidance. Not only must playthings be supplied but they must be playthings suited to the infant or young child's stage of development. It is impossible to try to force the orderly maturation of the developing child by providing him with play materials that are beyond his capacity to constructively use. Because the infant or young child finds such playthings unsatisfying they are usually discarded, and recourse is had to known infantile sources of pleasure and satisfaction. Too much adult regulation and too little freedom to satisfy the activities characteristic of any particular stage of growth have much the same result.

*With particular reference to thumb-sucking.*—While many theories have been advanced to account for thumb-sucking activity in infants it is probable that both its origin and the cause of sporadic re-activation are to be found in the processes of individual psycho-biological development occurring in a social milieu.



There can be no doubt that sucking is a reaction biologically stable and urgent, when the physiological equilibrium of the infant becomes unbalanced by need for food. Cannon<sup>7</sup> has conclusively shown that physiological need of food results in organic tensions within the viscera. These tensions, which are cumulative with increasing need, result in "drive" that expresses itself in behaviour that tends to reduce the tensions. The baby satiated with food refuses the persistently presented nipple with increasing degrees of emotionalized behaviour. In this instance behaviour is motivated, but it is motivated by negative body need. The infant who is excessively hungry, however, exhibits "drive" in no uncertain terms. He cries vociferously, thrashes about, and makes vigorous sucking movements with mouth and lips. This biologically determined motivation for sucking activities is reinforced by the fact that the mouth is one of the three centres of the body where the greatest number of nerves end, and is therefore extremely sensitive to stimuli that bring pleasurable sensory experiences.

The third biological item that explains the prevalence of thumb-sucking in infants and its spontaneous disappearance under normal conditions of growth and environment is stated by Gesell, as follows:

"The hand to mouth reaction is so fundamental that it may occur even in the fetal period. The tendency for things to go to the mouth is so strong that even the feet are pulled to the mouth by the infant as early as the 20th week. At the age of 32 weeks, hands, mouth, and feet frequently converge. The neuro-motor mechanism by which the hand is brought to the mouth undergoes important changes throughout the first year of life."<sup>8</sup>

"In general the hand to mouth reaction is very dominant at six months, is on the wane at nine months, and relatively inhibited at twelve months. If it is pronounced at twelve months and there are no associated symptoms of retardation it may express a personality factor of some kind which needs investigation."<sup>9</sup>

From all the evidence it would appear that sucking in the young infant is biologically motivated and that the self-preservation of the infant (in terms of food needs) is assured by the urgency and pleasantness of this activity. The biologically determined hand-mouth reaction, which is very strong in the early months of infancy, accounts for the common tendency to fist, finger or thumb sucking.

The gradual disappearance of this developmental hand-mouth reaction during the later months of infancy; the further maturation of the biological patterns of growth that have to do with ingestion and mastication of solids, resulting in the spontaneous cessation of sucking as a primary mode of feeding; and the progressive attachment of values to outside-the-self, people; objects, achievements and situations, which occurs under favourable conditions of environment and education—all are factors in the normal cessation of thumb-sucking activity.

By the age of one to two years thumb-sucking as a consistent activity should normally be literally "outgrown". Sporadic and transitory recurrence of the activity may occur when there is some irritation of the oral area, such as in teething, or if for some reasons the child's interest and attention are thrown back upon himself through inimical environmental pressures. Such sporadic or transitory thumb-sucking is, in these cases, symptomatic of underlying causes. No direct interference with the activity itself should ever be resorted to. The only intelligent procedure is to treat the underlying causes.

At no time have mental hygienists denied or ignored the scientifically proved fact that thumb-sucking continued over extended periods of time frequently results in deformities of the jaw, palate, and malocclusion. They have, however, consistently maintained the position that direct interference with the activity during the period of infancy is unnecessary, harmful to the normal psycho-biological development of the child, and probably the best means of ensuring the continuance of thumb-sucking activity. Mental hygienists have also consistently maintained that direct interference with a developed "habit" of thumb-sucking in the pre-school period in an attempt at "breaking the habit" is "putting the cart before the horse". Their viewpoint, as already pointed out, is that persistent thumb-sucking, when continued beyond normal developmental limits, is a symptom. A physician does not treat the rash of scarlet fever; he treats the systemic disturbance. A mental hygienist does not treat thumb-sucking in older children—he treats the psycho-biological disturbance.

It is unfortunate that this one principle of *non-interference* with thumb-sucking which is characteristic of the mental hygiene approach, has been seized upon by some paediatricians and most orthodontists. The former group have used it as a basis for "simple" advice to parents such as the following: "Just ignore it, and it will be outgrown". The latter group have used it as a basis for vehement attack upon mental hygiene philosophy and principles as "encouragers of the incidence of mouth deformities and malocclusion".

Members of these professional groups have seized upon one obvious principle of mental hygiene, but they have completely ignored the context in which the principle is applied. It is true that mental hygienists say "Don't interfere with thumb-sucking", but they say just as emphatically, "Do provide the child with the kind of environment and day-by-day education that will promote his wholesome growth, development, learning and adjustment. Under such conditions thumb-sucking will be relinquished at an early age—long before any permanent deformity can be caused by the activity."

Thumb-sucking when it occurs in infants should be regarded as a developmental incident,

normal in the psycho-biological process of infant and early pre-school growth. Instead of devoting time, effort, and concern to devising ways and means of preventing thumb-sucking, pediatricians, nurses and orthodontists could engage themselves much more profitably in the true interests of the child. They could educate parents in regard to child nature, and the normal orderly processes of growth and development to which brief references have been made in this pamphlet. They could educate parents in regard to environmental essentials that promote such orderly growth. They could educate parents in regard to what constitutes wholesome adult guidance of infant and child during the developmental years. But first, they must become educated along these lines themselves.

### CONCLUSIONS

1. Thumb-sucking is a normal activity in the infant.

2. Thumb-sucking should never be directly interfered with. For the infant this means that no mechanical devices of any sort should be used; there should be no taking or pulling the thumb out of the infant's mouth; there should be no show of disapproval or concern; there should be no punishments of any sort. For the pre-school child, in addition to the above there should be no ridiculing, criticism, or shaming. Instead of any of these methods of dealing with thumb-sucking activity intelligent attention must be given to the following principles, 3, 4, 5, 6 and 7.

3. Promote the child's wholesome socialization.

4. Provide play materials suited to the child's stage of development.

5. See that the child has opportunity and space to be active, to experiment, to explore, to play.

6. Ensure that regulation of the child is reduced to necessities and that as much freedom as possible to live through the interests normal at any particular stage of growth is permitted.

7. Ensure a home atmosphere of happiness, sympathy, patience and understanding.

8. When thumb-sucking activity is *persistent* continued with, beyond one year, special study should be made of the case, to ensure that items 3, 4, 5, 6 and 7 are amply safeguarded. It will usually be found that some modification of one or more of these items is indicated. The constructive education of the parent is the clue to discontinuance of the activity.

9. When thumb-sucking is habitual during the later pre-school years it should be regarded as a symptom of difficulties in psycho-biological development that are amenable to constructive treatment through environmental modifications and parent education. The same is true of sporadic thumb-sucking in the pre-school child, which occurs only when the child finds relief from unhappiness, insecurity, and a feeling of inadequacy in a temporary regression to infantile satisfactions and pleasures.

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The caduceus, or herald's wand, was given to Hermes by Apollo. In the *Encyclopedia Britannica*, the author says: "In its oldest form it was a rod ending in two prongs twined into a knot (probably an olive branch with two shoots adorned with ribbons or garlands) for which, later, two serpents with heads meeting at the top were substituted. The mythologists explained this by the story of Hermes finding two serpents thus knotted together while fighting; he separated them with his wand which, crowned by the serpents, became the symbol of the settlement of quarrels. A pair of wings was sometimes attached to the top of the staff in token of

the speed of Hermes as a messenger. In historical times, the caduceus was the attribute of Hermes as the god of commerce and peace, and among the Greeks it was the distinctive mark of heralds and ambassadors whose persons it rendered inviolable." It may be added that Hermes was not renowned for probity of character.

It would appear then that the caduceus has scant claim to medical importance and should not be used as the symbol of medicine. That right should be given to the signum of Æsculapius, and this should always be represented as a single snake coiled around a knotted staff.



## Men and Books

### PARACELSUS

By E. P. SCARLETT

*Calgary*

#### PART II.

Each man works in the "climate of opinion" of his age. "Thought's the slave of life", said Hotspur. And Paracelsus was a child of the Renaissance, or, to be more precise, he was an exponent of that temper of mind which resulted in the Reformation period. The Renaissance proper, its spirit, "a triple flame of sense, soul and intellect", found its first expression in Italy and in art and letters. It bred the universal man, incredible in energy and versatility. Paracelsus was of this breed, but not of the stature of Leonardo, Michelangelo, Erasmus or Thomas More. The central features of the Renaissance proper were the rediscovery of beauty, the triumph of the individual, and the revolt against intellectual tyranny. Paracelsus reflected the latter two characteristics, but, lacking the first, he was not of the company of which Erasmus was the great exemplar. He had something of the spiritual pride, the superb Renaissance effrontery, the violent contrasts in thought and action, which marked the time, but in him there was little of the richness, poetry and splendour of the earlier Renaissance years. Revolt had hardened into more austere categories. By the time he came on the scene all authority was being shaken, the bonds loosened, the curiosities fully awakened. Events were adding to the ferment; the discoveries of Vasco da Gama and Columbus, the Copernican astronomy, the first stirring of the religious revolt, the expansion of printing and of the universities. It was a rapidly widening world.

We must remember also that the Renaissance did not bring to Germany or the Low Countries the revival of the arts or the humanism that prevailed in Italy. The exception, of course, was Erasmus, but it was even his melancholy fate to be involved in disputes for which he had no liking. Rather, it brought a spirit of revolt in the theological, ecclesiastical and political thought, and Paracelsus carried the same spirit into medical thought. In France his great medical contemporary, Rabelais, was a man of another temper. In both the Renaissance freedom was superimposed upon mediæval subtleties. In Rabelais it produced a bizarre cynicism and an unhallowed mirth, in Paracelsus a violent crusading zeal and controversial spirit almost completely lacking in "sweetness and light".

We may now bring Paracelsus a little more clearly into focus if we turn from the Renaissance period as a whole to certain of its tides

of thought which finally issued in the rise of modern science. For centuries the universe had been defined as a hierarchy in which all questions, whether of theology, morality or scientific fact, were decided on the authority of established religion. Then came the first notes of dissent, and settled doctrine could be preserved only by constant repression of heresy. With the revival of learning and the increasing freedom of thought emerged a new mentality in which there was not only the passionate interest in general principles which was the legacy of scholasticism but also (and here is the new thing) an equal interest in relating these principles to the stubborn facts of existence and the natural world. In the union of these two points of view modern science was born and only awaited the experimental method to come into its own.

What was true of science in general applied equally to medicine. It was dominated by scholasticism and the teachings of Galen, for fourteen hundred years the great dictator of medicine. Massaria, professor of medicine at Pavia, could declare that he would rather err with Galen than be right with any other physician. But it was a Galenism encrusted by centuries of dogma and distorted by Arabic influences, theology, and occultism. The sixteenth century reeked of divination, and Paracelsus, though sceptical, recognized astral diseases. Indeed astrological elements in medicine survived among leading physicians until the beginning of the eighteenth century when we may find the famous Richard Mead still acknowledging the possibility of a lunar influence in health and disease.

Worse than the occultism were the corruption and inertia which lay heavy on the orthodox faculties. Even the first effect of the Renaissance spirit was to turn men to books and away from the observation of reality.

Science and modern medicine alike had their origin in a revolt against such a petrified cosmology. As Professor Whitehead has pointed out, it is a popular mistake to regard this historical revolt as an appeal to reason. On the contrary it was an appeal to nature and brute fact against the rigid rationality of mediæval thought; a necessary reaction, in Whitehead's phrase, "against the rationalistic orgy of the Middle Ages". In increasing degree the revolt repudiated philosophy. "It hath not pleased the Lord to give his people salvation in dialectic", said Ambrose.

This conception of the origin of modern science throws a flood of light on the character of Paracelsus and resolves many of the apparent contradictions in the estimates which have been made of the man and his work. The old and

new tendencies were of necessity confused in him, the anti-intellectual bias, the appeal to nature and practical experience, the scorn of the old rigid philosophies which had bound science for centuries. He was one of the stormy prophets of the revolt, and we must not expect to find in him the balance and detachment of the true scientist or the qualities of the Hippocratic physician. He called the medical world back to the contemplation of brute fact, and he not infrequently did so in a brutal way. The reformer rarely has the qualities of the humanist.

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Having projected Paracelsus against the world of his time we may briefly review some of the ideas which he endeavoured to impress upon the thought of his time. His main aim as we have seen was to break the bonds of ancient authority and accepted dogma. It should be remembered that he never broke completely with the past. Essentially his was a mediæval mind. His philosophy was that of the neo-Platonic speculative ideology of the day in which everything in the world from the highest to the lowest was a manifestation of a divine principle. In this system the universe (maerocosmos) and the individual (microcosmos) were similar, the vital principle in man being called the *Archæus*. Thus the dualism affirmed by theology between the natural and the supernatural which had such disastrous results in medical practice was abolished. With this neo-Platonic philosophy were blended in his scheme of things many of the orthodox doctrines of Christian theology, and much astrological and Oriental mysticism. His deviations from current thought were due to his insistence upon the empirical study of natural phenomena. In this respect he was the radical. This empirical spirit caused him to discard (a basic reform) the universally accepted doctrine of the four Aristotelian elements, earth, air, fire and water, and to substitute his own elements, mercury, sulphur and salt. Astronomy he conceived in more naturalistic terms; alchemy he regarded as more nearly approaching practical chemistry, claiming with singular clarity, "Alchemy is to make neither gold nor silver, its use is to make the supreme essences and to direct them against disease". This empirical scientific spirit, however primitive and distorted, made him an eclectic selecting from the philosophical systems of the day whatever seemed to him to be true, and accounts in the main for the bizarre mixture of his teachings.

His medical theories were similarly a strange medley of the supernatural and the physical, and they form no part of modern science. But his common sense, respect for facts, and a certain crude experimentation sharply opposed the medical Galenism of his day with its philosophy of the humours and supernatural theories of disease and its stilted and magical therapeutic agencies. His positive contributions to medicine

were notable. He was one of the first to insist that the body must be viewed as primarily chemical. He stressed the medical value of cleanliness in wounds. He taught that in all medicinal herbs there are certain specific elements which have specific therapeutic powers, and with this doctrine (a vital principle in chemistry) he attacked the atrocious pharmacopœia of the time. He favoured mercury and other mineral drugs at the expense of the vegetable concoctions. He popularized the use of opium. In surgery he made valuable observations on hospital gangrene and was the first to point out the connection between cretinism of the offspring and goitre of the parents. According to Bloch, his was the first observation of hereditary syphilis. He was the first to write of occupational disease, suggesting that some diseases might be peculiar to miners. He condemned the practice of excessive blood-letting as criminal. Above all he insisted on the ability and authority of the physician to treat illnesses because disease was caused by natural cosmic processes. On this count he gained the displeasure of the church. These were all positive contributions operating in a medium of fantastic philosophy and medicine. That Paracelsus was not a reformer in the same sense as Vesalius or Paré is due to the fact that he chose to oppose reactionary medical and ecclesiastical authority with mystical dogmas of his own, and that in the struggle which followed he used the traditional weapons of controversy and abusive dialectic. As one historian has shrewdly observed, being a mediævalist, he used mediæval tools to cut his mediæval bonds.

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It is difficult to attempt an evaluation of the influence of Paracelsus, for what he really was, beyond being an intellectual creature of the fieriest energy, the world has not yet finally decided. In some respects he was a sort of Dr. Faustus, and Goethe scholars have even suggested that he served in part as the model of "Faust". He had a good deal of the trappings of the philosophical chemists whom Leonardo called "lying interpreters". He was a borderline phenomenon between the age of mediæval dogmatism and modern empiricism. But the influence of his teachings is evidenced by the bibliography compiled by Sudhoff, in which two hundred and fifty works are recorded as appearing before 1600, and his influence remained powerful throughout the seventeenth century and even later. I may remind you that he had a commanding influence on the intelligence of the beloved physician of Norwich, Sir Thomas Browne, whose *Religio Medici* echoes Paracelsian ideas.

More particularly he brought into being the school of medicine known as the iatro-chemists, and revived the "doctrine of signatures". He introduced new remedies to the physician's

equipment. He gave a new direction to chemistry and helped to bring it into touch with those craft-sources from which it was to draw such wealth. In his use of the vernacular he had a liberating influence, and in this respect resembled Ambroise Paré, whose thrusts however were more subtly delivered than those of Paracelsus. In the main, however, like all violent reformers, he was a solitary figure, a sort of John the Baptist preparing the way for more constructive reforms, a corrosive agent attacking the false accretions of the past.

An estimate of the character and personality of the man himself is equally difficult, for genius of whatever sort is hard to assess. Some of the fiery particles of Paracelsus himself seem to have passed into the authors who have written about him. He has been extolled as a pious physician and somewhat of a martyr. He has been branded as a quack, a drunkard and a braggart. Some have said of him, as they said of Talleyrand: "If that man is not a villain, the Almighty does not write a legible hand". We find Montaigne writing:

"It is reported that a new start-up fellow whom they call Paracelsus, changeth and subverteth all the order of ancient, and so long time received rules, and maintaineth that untill this day it hath only served to kill people." (Book 2, chapt. 12).

Somewhere between these two extremes lies the true Paracelsus.

In some respects Paracelsus is one of the first medical jesters, in the true mediæval sense of that much abused word; a sort of Rabelais, Luther and Villon rolled into one. He possessed serious faults of character and a deplorable emotional and intellectual instability. While he was a life-long voyager in search of facts, he had a hot tongue in his head, and was anything but an exemplar of the scientific virtue of sobriety. His was a militant personality. To all his critics he retorted in effect with one of the favourite oaths of Rabelais: "May St. Anthony's fires scorch your snouts". A wise modern writer has said that one touch of egotism makes the whole world kin, and Paracelsus, Heaven knows, had more than a touch. He saw his own shadow everywhere in the universe like the shadow of a conqueror with great tidings. This made him a great controversialist who did more than bite his thumb at his opponents and gently give them the lie. He was a master of boisterous invective, a Shakespearian Pistol with a style, who insisted on being heard and whose words were sturdy and swaggering vagabonds. Such vainglorious lust of life in action which was the mark of so many men of the Renaissance unfortunately at times has a way of being absurd and produces an uncomfortable effect. A contemporary of Paracelsus, the kindly Conrad Gesner, could only explain his actions by saying that he was possessed of the Devil. But withal Paracelsus was a violent figure who

reached for the secrets of life and was possessed of many fine intuitions. He could write these words:

"Faith is a luminous star that leads the honest seeker into the mysteries of Nature. You must seek your point of gravity in God, and put your trust in an honest, sincere, divine, pure and strong faith, and cling to it with your whole heart and sense and thought, full of love and confidence."

Like so many of the artists and scientists of his period—seekers of beauty in ideal realms—he was a creature of contrasts. The great French poet Villon was King of Vagabonds in Paris. Our own Christopher Marlowe was stabbed in a tavern brawl. The mathematician Cardan (1501-1576) divided his time between intensive study and equally intensive debauchery. He personally cropped the ears of one of his sons and cast the horoscope of Christ but still worked out means to teach the deaf and dumb to read and write. To capture the attention of humanity it is necessary to be for or against some ideal, and the man whose "dæmon" drives him to such a rôle must be a fiery spirit. Such was Paracelsus. Such a man is not to be pitied; he is only to be tolerantly understood as no fit member of an ordered complacent community. Only the most ruthless, self-reliant natures can hope to be great reformers or good artists, for they have to work with one hand while with the other they defend themselves.

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At the outset we stated that the events and atmosphere of today should give us a special interest in Paracelsus. The evils of the present moment have been diagnosed in various ways, but in essence they represent a revolt against the things for which the Renaissance stood, particularly the liberty of the individual. And without such freedom art and medicine cannot long exist. It is moreover a pitifully superficial view of this revolt to regard it as inspired by certain individuals and national groups ranged on the opposite side of the battle-line. At the worst they are the active agents in the catastrophe.

"The wrong is mixed. In tragic life, God wot  
No villain need be! Passions spin the plot;  
We are betrayed by what is false within."

Throughout the world there has been a weakening of moral and intellectual integrity. Today people respect bits or entire systems of religion or philosophy which they have inherited, as they respect art museums. In science there is a deplorable absence of a comprehensive attitude to life. We are quite accustomed to seeing our men of science ethical barbarians, supremely indifferent to the implications of their special activities.

If we are not to pass into a period of decadence there is the need for a renewal of faith coupled with decision and action. It is here that Paracelsus has significance for us today.

When confronted with an outworn creed and order of medicine he proclaimed his faith. Like another prophet of revolution, Voltaire, he stood on no convention and was scornful of the prudent balance of the scientific or judicial mind; his creed was not as explicit as Voltaire's, but in the main, though delivered with an unstable passion and over-coloured rhetoric, it was the same: "Érasez l'infâme". He suffered as a result, for as Milton says, "Truth never comes into the world, but like the bastard, to the ignominy of him that brought her forth; till Time, the mid-wife, rather than the mother of

truth, hath washed and salted the infant, and declared her legitimate."

Time has resolved most of the ignominy which was heaped on Paracelsus in his century. From the historian's point of view he is not an attractive figure. He lacked the balance of mind, the humour and capacity for friendship, which keep life sweet. To come close to him is to be impressed by the pitiful limitations of human nature and the pathetic "sound and fury" of human life, and yet to be stirred by the courage which is in man and the force which drives him on his eternal search for ultimate truth.

## Association Notes

### THE SEVENTY-SECOND ANNUAL MEETING

of the

## Canadian Medical Association

WINNIPEG, JUNE 23, 24, 25, 26, 27, 1941

Convention Headquarters—Royal Alexandra Hotel

<i>President</i>	- - -	DR. DUNCAN GRAHAM, Toronto
<i>President-Elect</i>	- - -	DR. GORDON S. FAHRNI, Winnipeg
<i>General Secretary</i>	- - -	DR. T. C. ROUTLEY, Toronto

### REGISTRATION

Registration will take place at the Convention Headquarters from June 23rd to 27th. The Registration Booth will be open from 8.30 a.m. to 6.00 p.m.

Membership in good standing in the Canadian Medical Association constitutes eligibility for registration. Invited guests, and visitors from other countries will be registered without fee upon presentation of credentials.

Canadian practitioners who are not members of the Canadian Medical Association but are members of their Division may register upon payment of the annual fee.

### TRANSPORTATION

Identification certificates may be obtained from the office of the General Secretary, 184 College Street, Toronto. These certificates entitle the purchaser to round-trip fare at one and one-third of the adult normal one-way first class or coach fare, plus 25 cents. Tickets are good going and returning via same route, or going via one authorized route and returning via any other authorized route. Return limit, thirty days, in addition to date of sale. Passengers must reach original starting point not later than midnight of final return limit.

### Dates of sale:

From Ontario (Port Arthur, Armstrong and West), Manitoba, Saskatchewan, Alberta and British Columbia—June 17th to 23rd (both dates inclusive).

From Ontario (east of Port Arthur and Armstrong), Quebec, New Brunswick, Nova Scotia, and Prince Edward Island, June 16th to 24th (both dates inclusive).

### HOUSING

The Committee on Housing would appreciate early hotel reservations. The following is a list of hotels and their rates:

### WINNIPEG HOTELS

#### DAILY RATES—EUROPEAN PLAN

	<i>Single room without bath</i>	<i>Single room with bath</i>	<i>Double room without bath</i>	<i>Double room with bath</i>
Clarendon Hotel.....	\$1.50	\$2.00	\$2.00	\$3.00
Fort Garry Hotel.....	3.50	5.00	5.00	7.00
Mall Hotel.....	2.50	3.00	4.00	5.00
Marlborough Hotel....	2.00	3.00	3.00	4.50
Royal Alexandra Hotel	3.50	5.00	5.00	7.00
St. Charles Hotel.....	1.50	2.25	2.50	4.00
St. Regis Hotel.....	1.50	2.50	2.50	3.50

**GOLF**

The Golf Tournament will take place on Tuesday, June 24th, commencing at 8.30 a.m., at the Niakwa Country Club. In addition to the Ontario Cup, a number of other valuable prizes will be offered.

Golfing privileges will be granted to delegates and guests of the Convention on June 24th, 25th, 26th and 27th, at the following Clubs:

The Niakwa Club (green fees, \$1.00).

The St. Charles Country Club (green fees, \$1.50).

Southwood Country Club (green fees, 75c in the morning and \$1.00 in the afternoon).  
Pine Ridge Golf Club (green fees, \$1.00).  
Elmhurst Golf Links, June 25th, 26th and 27th, only (green fees, \$1.00).

At the St. Charles Country Club players must present guest cards for identification purposes. At the other Clubs, players will be admitted on presentation of the convention registration badge.

For further information regarding golf clubs and their location, transportation, etc., inquire at the Registration Desk.

**GENERAL PROGRAM**

(See also Ladies' Program).

Friday and Saturday, June 20th and 21st, Executive Committee Sessions

**MONDAY, JUNE 23RD**

- 9.00 a.m.—Registration.
- 9.30 a.m.—Meeting of General Council.
- 12.30 p.m.—Luncheon.
- 2.00 p.m.—Meeting of General Council.
- 6.00 p.m.—Meeting of Nominating Committee.
- 7.00 p.m.—Medical Secretaries' Dinner and Conference.

**TUESDAY, JUNE 24TH**

- 9.00 a.m.—Registration.
- 9.30 a.m.—Meeting of General Council.
- All Day—Golf Tournament.
- 12.30 p.m.—Luncheon.
- 2.00 p.m.—Business Meeting of Manitoba Division.
- 2.00 p.m.—Business Meeting of Saskatchewan Division.
- 2.30 p.m.—Joint Relations Council on Medical Education, Hospitals and Liensure.

**WEDNESDAY, JUNE 25TH**

- 8.30 a.m.—Registration.
- 9.00 a.m.—Round-Table Conferences.
- 10.15 a.m.—General Session.
- 12.30 p.m.—Luncheon.
- Guest Speakers—
  - His Worship John Queen, Mayor of Winnipeg.
  - Dr. Sidney Smith, K.C., M.A., LL.B., LL.D., D.C.L., President, University of Manitoba.
- 2.00 p.m.—Sectional Meetings.
- 4.30 p.m.—Reception by the President-Elect and Mrs. Gordon S. Fahrni, St. Charles Country Club.
- 8.30 p.m.—Annual General Meeting.
- 10.30 p.m.—Reception and Dance.

**THURSDAY, JUNE 26TH**

- 8.30 a.m.—Registration.
- 9.00 a.m.—Round-Table Conferences.
- 10.15 a.m.—General Session.
- 12.30 p.m.—Luncheon.
- Guest Speaker—
  - Dr. E. L. Ross, President, Canadian Medical Association (Manitoba Division).
- 4.30 - 6.00 p.m.—Reception at Government House.
- His Honour the Lieutenant-Governor and Mrs. R. F. McWilliams will entertain the members of the Association and their wives.
- 7.00 p.m.—Stag Dinner.
- 8.00 p.m.—Medical Economics Evening.
- Municipal doctor system in Saskatchewan
- Dr. R. O. Davison, Regina.
- What is an adequate medical service?
- Dr. E. S. Moorhead, Winnipeg.
- Some weaknesses observed in health insurance Acts
- Dr. T. C. Routley, Toronto.
- Summary
- Mr. Hugh H. Wolfenden, Toronto, Consulting Actuary of the Association.

**FRIDAY, JUNE 27TH**

- 8.30 a.m.—Registration.
- 9.00 a.m.—Round-Table Conferences.
- 10.15 a.m.—General Session.
- 12.30 p.m.—Luncheon.
- Guest Speaker—
  - Brigadier R. M. Gorssline, Director General of Medical Services.
- Immediately following the address, the Canadian Medical Protective Association will hold its annual meeting.
- 2.00 p.m.—Sectional Meetings.

**LADIES' PROGRAM**

MONDAY, JUNE 23RD

- 4.00 p.m.—Tea at the University Women's Club for the wives of the members of the Canadian Medical Association General Council.

TUESDAY, JUNE 24TH

- 1.00 p.m.—Luncheon at the St. Charles Country Club for the wives of members of the General Council and the wives of the Executives of the Saskatchewan and Manitoba Divisions.  
Hostess—Mrs. Gordon S. Fahrni.
- 7.00 p.m.—Supper (informal) at the Manitoba Club for the wives of members of the General Council and the wives of the Executives of the Saskatchewan and Manitoba Divisions.  
Hostess—Mrs. Edward L. Ross.

WEDNESDAY, JUNE 25TH

- 4.30 to 6.00 p.m.—Reception at the St. Charles Country Club for members of the Association and their wives, by the President-Elect and Mrs. Gordon S. Fahrni.

Wednesday, June 25th—*Continued*

- 8.30 p.m.—Ceremonial and Installation of the President of the Canadian Medical Association, at the Royal Alexandra Hotel.
- 10.30 p.m.—Association Reception and Dance at the Royal Alexandra Hotel. Families of members are welcome. Tickets, \$1.00 per person.

THURSDAY, JUNE 26TH

- 4.30 to 6.00 p.m.—Reception at Government House by His Honour the Lieutenant-Governor and Mrs. R. F. McWilliams for members of the Association and their wives.
- 7.30 p.m.—Ladies' Dinner (formal) at the Fort Garry Hotel. Tickets \$1.25. Transportation for the visiting ladies may be arranged at the Registration Desk.

FRIDAY, JUNE 27TH

- 10.00 a.m.—Breakfast Party at the Motor Country Club, Lower Fort Garry. Tickets 75c. Transportation for the visiting ladies may be arranged at the Registration Desk.

**SCIENTIFIC PROGRAM****GENERAL SESSIONS**

WEDNESDAY MORNING, JUNE 25TH

- 10.15 a.m.—  
Dr. Charles Hunter, Winnipeg  
Dizziness from the internist's standpoint.
- Dr. William F. Braasch, Rochester, Minn.  
The surgical kidney as a factor with hypertension.
- Valedictory Address by the President  
Dr. Duncan Graham, Toronto.
- Dr. C. D. Parfitt, Toronto  
The Osler Lecture.

THURSDAY MORNING, JUNE 26TH

- 10.15 a.m.—  
Dr. F. W. Jackson, Winnipeg  
Some observations on maternal care.
- Dr. Ralph M. Tovell, and  
Dr. Curtiss B. Hickcox, Hartford, Conn.  
The present status of cyclopropane.
- Dr. G. E. Richards, Toronto  
Ten years' progress in the radiotherapy of oral cancer. Present methods and present results.
- Dr. Gavin Miller, Montreal  
Recent advances in the surgical approach to carcinoma of the large bowel and rectum.

FRIDAY MORNING, JUNE 27TH

- 10.15 a.m.—  
Dr. A. F. Menzies, Morden  
Post-war medical problems.
- Dr. Rustin McIntosh, New York  
Jaundice.

Friday Morning, June 27th—*Continued*

- Dr. Wallace Wilson, Vancouver  
Whither Medicine!
- Dr. K. G. McKenzie, and  
Dr. E. H. Botterell, Toronto  
The common neurological syndromes produced by pressure from extrusion of an intervertebral disc. (Illustrated by coloured film).

**ROUND-TABLE CONFERENCES**

WEDNESDAY, JUNE 25TH

9.00 - 10.00 a.m.—

**Section of Medicine**

Migraine.

- Dr. G. L. Adamson (Chairman), Winnipeg  
Dr. A. R. MacLean, Rochester  
Dr. Donald McEachern, Montreal

**Section of Obstetrics and Gynaecology**

Management of ante- and post-partum hæmorrhage.

- Dr. Ross Mitchell (Chairman), Winnipeg  
Dr. A. B. Nash, Vancouver  
Dr. J. A. Brown, Regina  
Dr. John Mann, Toronto

**Section of Ophthalmology**

Orthoptic treatment of strabismus.

- Dr. F. A. MacNeil (Chairman), Winnipeg  
Dr. C. M. Clare, Winnipeg  
Dr. I. H. Beckman, Winnipeg  
Dr. J. McGillivray, Winnipeg

## Wednesday, June 25th—Continued

## Section of Surgery

## Fractures.

- Dr. A. Gibson (*Chairman*), Winnipeg  
 Dr. R. I. Harris, Toronto  
 Dr. George Ramsay, London  
 Dr. J. R. Naden, Vancouver

## Section of Urology

## Bladder tumours.

- Dr. H. D. Morse (*Chairman*), Winnipeg  
 Dr. Emerson Smith, Montreal  
 Dr. J. C. McClelland, Toronto  
 Dr. Frederick Pileher, Calgary

## THURSDAY, JUNE 26TH

9.00 - 10.00 a.m.—

## Section of Medicine

## Normal blood pressure variations.

- Dr. L. G. Bell (*Chairman*), Winnipeg  
 Dr. J. D. Adamson, Winnipeg

## Section of Obstetrics and Gynaecology

## Carcinoma of the uterus.

- Dr. J. D. McQueen (*Chairman*), Winnipeg  
 Dr. A. W. Blair, Regina  
 Dr. J. P. Kearns, Montreal  
 Dr. W. G. Cosbie, Toronto

## Section of Ophthalmology

## Corneal lesions.

- Dr. J. T. Cruise (*Chairman*), Winnipeg  
 Dr. E. H. Alexander, Winnipeg

## Section of Pædiatrics

## Chronic cough in childhood.

- Dr. O. J. Day (*Chairman*), Winnipeg  
 Dr. R. R. Struthers, Montreal  
 Dr. Alan Brown, Toronto  
 Dr. Gregor McGregor, Toronto

## Thursday, June 26th—Continued

## Section of Surgery

## Acute appendicitis.

- Dr. P. H. T. Thorlakson (*Chairman*),  
 Winnipeg  
 Dr. Roscoe R. Graham, Toronto  
 Dr. L. H. McKim, Montreal  
 Dr. D. E. Robertson, Toronto

## Section of Urology

## The present status of endocrine therapy in urology.

- Dr. C. B. Stewart (*Chairman*), Winnipeg  
 Dr. D. W. MacKenzie, Montreal  
 Dr. Earle R. Hall, Vancouver

## FRIDAY, JUNE 27TH

9.00 - 10.00 a.m.—

## Section of Medicine

## Prevention of common cold.

- Dr. William Wood (*Chairman*), Winnipeg  
 Dr. Donald Fraser, Toronto  
 Dr. U. J. Gareau, Regina

## Section of Otolaryngology

## Upper respiratory infections.

- Dr. Robert Black (*Chairman*), Winnipeg

## Section of Pædiatrics

## Genito-urinary infections in childhood.

- Dr. Bruce Chown (*Chairman*), Winnipeg  
 Dr. H. S. Little, London  
 Dr. Frank S. Patch, Montreal  
 Dr. C. B. Stewart, Winnipeg

## Section of Surgery

## Tumour clinic.

- Dr. Daniel Nicholson (*Chairman*),  
 Winnipeg  
 Dr. George T. Pack, New York  
 Dr. M. R. MacCharles, Winnipeg

## SECTIONAL MEETINGS

## WEDNESDAY AFTERNOON, JUNE 25TH

## Section of Anæsthesia

2.00 p.m.—

- Dr. D. H. Huggins, Winnipeg  
 Avertin in neuro-surgery.  
 Dr. D. G. Revell, Jr., Winnipeg  
 Ether, the all-purpose anæsthetic.  
 Dr. H. V. Rice, Winnipeg  
 Newer concepts of anæsthetic physiology.  
 Dr. C. H. Robson, Toronto  
 Anæsthesia for children (illustrated by  
 coloured film).  
 Dr. R. M. Tovell, and  
 Dr. A. W. Friend, Hartford, Conn.  
 The control of physical hazards of anæsthesia.

## Wednesday Afternoon, June 25th—Continued

## Section of Historical Medicine

2.00 p.m.—

- Dr. W. A. Gardner, Winnipeg  
 A voice from St. Helena.  
 Dr. J. A. Gunn, Winnipeg  
 Ambroise Paré as a military surgeon.  
 Dr. D. S. Macnab, Calgary  
 Dr. Hugh Owen Thomas.  
 Dr. D. G. Revell, Sr., Edmonton  
 The first twenty-five years of anatomy teaching in Alberta.

Wednesday Afternoon, June 25th—*Continued*  
Section of Medicine

2.00 p.m.—

Dr. Eldon M. Boyd, Kingston

Expectoration, expectorants and cough medicines.

Dr. E. S. Mills, and

Dr. E. S. Murray, Montreal

The relative value of the various sulfonamide drugs in the treatment of acute respiratory infections including pneumonia.

Dr. R. J. Collins, East Saint John

Problems arising in rehabilitation schemes for the tuberculous.

Dr. D. S. McEwen, Winnipeg

Upper respiratory infection in general practice.

Dr. William Boyd, Toronto

Changing views regarding pyelonephritis.

Dr. J. H. Geddes, London

What is colitis?

Section of Obstetrics and Gynæcology

2.00 p.m.—

Dr. W. S. Holmes, Saskatoon

Induction of labour—indications, methods and dangers.

Dr. Léon Gérin-Lajoie, Montreal

Contribution to the surgery of the pre-sacral nerve in gynæcological ailments.

Dr. P. J. Kearns, Montreal

Anatomical changes in the lower uterine segment in pregnancy and labour.

Dr. John Mann, Toronto

Toxæmia of pregnancy; present day classification; etiology and treatment.

Section of Pædiatrics

2.00 p.m.—

Dr. K. Borthwick-Leslie, Winnipeg

Pre- and post-operative sedation in children.

Dr. F. F. Tisdall, Toronto

War and post-war problems regarding childhood nutrition.

Dr. A. R. Birt, Winnipeg

Troublesome skin diseases in infancy and childhood.

Dr. Alfred Deacon, Winnipeg

Rehabilitation of poliomyelitis cases.

Dr. U. J. Gareau, Regina

Acrodynia, abstracts of 75 cases.

Wednesday Afternoon, June 25th—*Continued*  
Section of Surgery

2.00 p.m.—

Dr. A. C. Abbott, Winnipeg

Inguinal hernia with special reference to recurrence.

Dr. Walter G. Carscadden, Toronto

Injuries of the hand.

Dr. W. F. Gillespie, Edmonton

The treatment of perianal abscess and fistula.

Dr. R. K. Magee, Peterborough

Subphrenic abscess.

Dr. Herbert Meltzer, Ninette

181 cases of thoracoplasty.

Section of Urology

2.00 p.m.—

Dr. E. D. Busby, London

Present status of chemotherapy in urinary infections.

Dr. W. F. Braasch, Rochester, Minn.

Prognosis in bilateral renal tuberculosis.

Dr. J. C. McClelland, Toronto

Anuria.

Dr. Frank S. Patch, and

Dr. J. T. Codnere, Montreal

Treatment of hydronephrosis secondary to aberrant renal vessels.

Dr. Frederick Pilcher, Calgary

The place of trans-urethral operations in prostatic obstruction.

THURSDAY AFTERNOON, JUNE 26TH

Section of Anæsthesia

2.00 p.m.—

Symposium on Spinal Anæsthesia

Dr. Byron R. Burwash, Saskatoon

Analeptics.

Dr. I. H. Davidson, Winnipeg

Pre-medication.

Dr. K. E. Hollis, Toronto

Indications and contraindications.

Dr. H. J. Shields, Toronto

Physiology.

Dr. G. D. Stanley, Calgary

Sequelæ in intraspinal anæsthesia.

Dr. Norman S. Clark, Toronto

Agents.



## Thursday Afternoon, June 26th—Continued

## Section of Historical Medicine

2.00 p.m.—

Dr. William Boyd, Toronto

Medical history by centuries and decades.

Dr. Jabez H. Elliott, Toronto

Osler's class at the Toronto School of Medicine.

Dr. J. C. Hossack, Winnipeg

History of the plague.

Dr. A. G. Nicholls, Montreal

Herba panacea.

Dr. N. R. Rawson, Winnipeg

William Farr, founder of vital statistics.

## Section of Medicine

2.00 p.m.—

Dr. F. T. Cadham, Winnipeg

Vaccine therapy in atrophic arthritis.

Dr. A. A. Fletcher, and

Dr. Wallace Graham, Toronto

Gold therapy in chronic arthritis.

Dr. A. T. Cameron, Winnipeg

Blood plasma; proteins; their clinical significance.

Dr. John W. Scott, Edmonton

The natural history of migraine.

Dr. S. E. C. Turvey,

Dr. J. A. Leroux, and

Dr. Donald H. Williams, Vancouver

The diagnosis of asymptomatic neurosyphilis.

Dr. T. A. Pincock, Brandon

Transitions in psychiatry.

## Section of Ophthalmology

2.00 p.m.—

Dr. D. M. Genoff, Winnipeg

Senile cataract.

Dr. H. O. McDiarmid, Brandon

Intra-ocular tumours.

Dr. F. D. McKenty, Winnipeg

The results of tarsectomy and a simplification of the technique.

Dr. Fred T. Tooke, and

Dr. John V. V. Nicholls, Montreal

The incidence and character of hæmorrhages occurring in the retina in diabetes.

## Section of Pædiatrics

2.00 p.m.—

Dr. R. R. Struthers, and

Dr. H. L. Bacal, Montreal.

The significance of rheumatic nodules in childhood.

## Thursday Afternoon, June 26th—Continued

Dr. Alton Goldbloom, and

Dr. N. W. McLellan, Montreal

Staphylococcal septicæmia — prognosis and treatment.

Dr. Donald Fraser, Toronto

Prophylactic immunization in children.

Dr. Alan Brown, Toronto

Diarrhœa.

## Section of Radiology

2.00 p.m.—

Symposium on Carcinoma of the Cervix

Anatomy—

Professor I. MacLaren Thompson, Winnipeg.

Pathology—

Dr. Sara Meltzer, Winnipeg.

Radium—

Dr. Ethlyn Trapp, Vancouver.

X-radiation—

Dr. A. W. Blair, Regina.

Metastasis and management—

Dr. B. R. Mooney, Winnipeg.

Complications following radiation treatment in carcinoma of the cervix—

Dr. W. G. Cosbie, Toronto.

## Section of Surgery

2.00 p.m.—

Dr. M. R. MacCharles, Winnipeg

Causes of poor results in biliary tract surgery.

Dr. J. S. McEachern, Calgary

Some surgical conditions arising from developmental errors.

Dr. H. F. Moseley, Montreal

Shoulder pain.

Dr. O. W. Niemeier, Hamilton

Obstructive jaundice.

Dr. Charles W. Harris, Toronto

Injuries about the ankle joint.

Dr. Lorne H. McConnell, Saskatoon

Epilepsy — analysis of the results of 91 craniotomies.

## Section of Urology

2.00 p.m.—

Dr. Robin Pearse, Toronto

Lipofibrosarcomata of the kidney.

Dr. Earle R. Hall, Vancouver

Carcinoma of the penis.

Dr. W. A. Dakin, Regina

Cutaneous ureterostomy — indications, technique and results.

**Thursday Afternoon, June 26th—Continued**

Dr. Emerson Smith, Montreal

Experiences with interstitial cystitis

Dr. C. B. Stewart, Winnipeg

Persistent Wolffian duct—report of cases.

Dr. G. N. Tucker, Edmonton

Traumatic injury of the bladder associated with avulsion of aberrant lower pole vessels.

**FRIDAY AFTERNOON, JUNE 27TH****Section of Medicine**

2.00 p.m.—

Dr. G. F. Amyot, Victoria

Public health and the private practice of medicine.

Dr. Trevor Owen, Toronto

Fatigue, rest and exercise.

Dr. F. C. Heal, Moose Jaw

The management of common disorders of cardiac rhythm.

Dr. Harris McPhedran, Toronto

Cardiovascular disease associated with toxic goitre.

Dr. J. M. McEachern, Winnipeg

Coronary disease in Manitoba.

**Section of Military Medicine**

2.00 p.m.—Round-Table Conference.

Medical aspects of casualties returning from overseas.

**Introduction—**Lieut.-Colonel A. M. Davidson, President,  
Standing Medical Board, No. 10 Detachment, R.C.A.M.C., M.D. 10.**Medical Cases—**Major B. H. Olson, No. 10 Detachment,  
R.C.A.M.C.Dr. J. D. Adamson, Medical Staff,  
D.P.&N.H., Winnipeg.**Surgical Cases—**Lieut.-Colonel T. E. Holland, R.C.A.M.C.,  
Officer Commanding, Fort Osborne  
Military Hospital, M.D. 10.Dr. J. A. Gunn, Surgeon, D.P.&N.H.,  
Winnipeg.**Problems of Army Hygiene**Major M. R. Elliott, District Hygiene  
Officer, No. 10 Detachment, R.C.A.M.C.Special problems of the R.C.A.F. Medical  
Officer

Wing-Commander G. E. Hall, Ottawa.

**Friday Afternoon, June 27th—Continued****Section of Obstetrics and Gynaecology**

2.00 p.m.—

Dr. C. R. Rice, Winnipeg

Disturbances of menstrual function in tuberculous patients.

Dr. N. W. Philpott, Montreal

Anæsthesia and analgesia in obstetrics with particular reference to the use of local anæsthesia.

Dr. F. G. McGuinness, Winnipeg

The clinical significance of intra-cranial injury of the newborn.

Dr. A. B. Nash, Victoria

Treatment of acute and chronic salpingitis.

**Section of Otolaryngology**

2.00 p.m.—

Dr. G. W. Fletcher, Winnipeg

Tumours of the larynx—diagnosis and treatment.

Dr. Keith Hutchison, Montreal

Acute otitic meningitis; chemotherapy advances.

Dr. Gregor McGregor, Toronto

Bronchoscopy—a safeguard against diagnostic errors.

Dr. G. Edward Tremble, Montreal

Irrigation of the sphenoid sinuses—a safe and simple method (illustrated by coloured film).

Dr. E. J. Washington, Winnipeg

Lateral sinus thrombosis of otitic origin.

Clinical presentation of cases at the General Hospital and St. Boniface Hospital.

**Section of Pædiatrics**

2.00 p.m.—

Dr. H. S. Little, London

Chemotherapy of meningococcic meningitis.

Dr. Rustin McIntosh, New York

Nephritis.

Dr. L. M. Lindsay, and

Dr. F. W. Wigglesworth, Montreal

Report of two cases of purpura fulminans.

Dr. Graham Ross, Montreal

The use of vitamin K in pædiatric practice, with special reference to the newborn period.

## Friday Afternoon, June 27th—Continued

## Section of Radiology

2.00 p.m.—

Dr. L. J. Carter, Brandon

Radiological examination of the terminal ileum and proximal colons—a twenty-five year résumé.

Dr. A. D. Irvine, Edmonton

Coarctation of the aorta, radiologically considered.

Dr. Hervé Lacharité, Montreal

Osteochondritis desiccans.

Dr. W. H. McGuffin, Calgary

Radiological evidence as a diagnostic aid in diseases of the heart.

Dr. Carleton B. Peirce, and

Dr. D. L. McRae, Montreal

Bronchography in pulmonary disease of undetermined cause.

## Section of Surgery

2.00 p.m.—

Dr. C. W. Burns, Winnipeg

Surgical management of traumatic abdomen.

Dr. Robert C. Laird, Toronto

The diagnosis and treatment of bronchiectasis.

Dr. George Ramsay, London

Anterior poliomyelitis; observations on recovery rate of paralyzed muscles.

Dr. Fulton Risdon, Toronto

The present status of the treatment of hare lip and cleft palate deformities.

Dr. Dudley E. Ross, and

Dr. J. H. Palmer, Montreal

The surgical treatment of patent ductus arteriosus.

## SCIENTIFIC EXHIBITS

Dr. A. C. ABBOTT, Dr. J. PRENDERGAST.

University of Manitoba, Department of Medicine and Pathology. "Histological variations of the thyroid gland of various animals of western Canada".

VIOLEA BARRY. (By invitation).

Winnipeg General Hospital and Winnipeg Children's Hospital, Manitoba Branch of Canadian Physiotherapy Association. "Physiotherapy exhibit".

Dr. D. J. BOWIE. (By invitation).

Department of Anatomy, University of Manitoba. "Microscopic demonstrations;

I. The brain stem and spinal cord.

II. The development of bone.

III. The gastric mucosa.

IV. The Islets of Langerhans in the pancreas".

## Scientific Exhibits—Continued

PROFESSOR A. T. CAMERON.

Department of Biochemistry, University of Manitoba. "Some typical and some rare gall stones and their composition".

Dr. MARGARET G. DUDLEY. (By invitation).

Winnipeg, Manitoba. "Air-borne allergens of Manitoba".

Dr. F. W. JACKSON.

Department of Health and Public Welfare, Manitoba. "Manitoba pregnancy survey. Prenatal care".

Dr. J. C. McMILLAN, Dr. B. R. MOONEY,

Dr. R. A. MACPHERSON.

Winnipeg General Hospital. "A cross-section of routine roentgenology".

Medical historical exhibit.

Exhibitors—Dr. I. M. THOMPSON.

Dr. JABEZ H. ELLIOTT.

Dr. D. G. REVELL, SR.

Dr. ROSS MITCHELL.

Dr. DANIEL NICHOLSON.

Department of Pathology, University of Manitoba. "Exhibit of pathological specimens".

Dr. MAURICE POWERS.

Royal Canadian Mounted Police, Regina. "Legal medicine".

Dr. D. G. REVELL, SR.

Edmonton, Alberta. "Old surgical instruments and pathological exhibit".

Dr. G. E. RICHARDS.

Toronto General Hospital. "Radiotherapy of oral cancer".

Dr. FULTON RISDON.

Toronto, Ontario. "Oral and plastic surgery of the face".

Dr. L. A. SIGURDSON.

Department of Anatomy, University of Manitoba. "Sections of brain stained to show white and gray matter".

Dr. I. M. THOMPSON, Prof. A. E. MACDONALD,

Dr. DIGBY WHEELER.

University of Manitoba. "The structure of bone".

Dr. P. H. T. THORLAKSON.

Department of Surgery, University of Manitoba. "Surgical lesions of the gastrointestinal tract".

Dr. DIGBY WHEELER.

Department of Radiology, University of Manitoba. "Radiological exhibit".

## JOINT RELATIONS COUNCIL ON MEDICAL EDUCATION, HOSPITALS AND LICENSURE

The third annual conference of this body will be held in the Royal Alexandra Hotel, Winnipeg, on Tuesday, June 24th at 2.30 p.m. Representatives of the universities, the licensing bodies, the Provincial Divisions, the Canadian Hospital Council, the Medical Council of Canada, the Canadian Public Health Association, the Royal College of Physicians and Surgeons of Canada and other organizations will convene to discuss a number of problems of mutual and vital interest.

## THE FEDERATION OF MEDICAL WOMEN OF CANADA

The annual "get-together" of the medical women takes place when the members are assembled for the Canadian Medical Association Convention. There will be a Breakfast Meeting this year, on Tuesday, June 24th, at 10 a.m. in the University Women's Club, 54 Westgate, Winnipeg.

Dinner in honour of visiting medical women has been arranged for Thursday, June 26th, at the Manitoba Club.

Bring your Golf Clubs.

## By-Laws Governing Membership in and Attendance at Annual Meetings of the Canadian Medical Association

Now that all Provincial Medical Associations have become Divisions of the Canadian Medical Association the By-Laws for Divisions become applicable to Canada as a whole. It is well, therefore, that all members, both of the parent Association and of Divisions, clearly understand the basis of membership and annual meeting arrangements, including registration.

With that end in view, the following extracts from the By-Laws of the Canadian Medical Association are published.

### CHAPTER I — DIVISIONS

"A Branch Association may become a Division as outlined in Article V of the Constitution and enjoy all the rights and privileges of a Division in the following manner:

1. By intimating to The Canadian Medical Association in writing that it desires to become a Division.
2. By agreeing to amend where necessary its Constitution and By-Laws, to place them in harmony with the Constitution and By-Laws of this Association.
3. By agreeing to collect from all of its Divisional Members who desire to be members of The Canadian Medical Association such annual fee as may from time to time be set for membership and remit same to this Association.
4. By agreeing to take such steps as seem proper to the Division to increase membership in The Association."

### CHAPTER II, SECTION 9

#### REGISTRATION AT MEETINGS

"No member shall take part in the proceedings of the Canadian Medical Association, or in the proceedings of any of the sections thereof, or attend any part of the

meeting until he has properly registered. Only members and invited guests are eligible to register and attend an annual meeting."

### CHAPTER IV — SECTION 2

#### ARRANGEMENTS FOR ANNUAL MEETINGS

"When the Canadian Medical Association meets in any province where there is a Branch Association or Division the meeting of that Branch Association or Division for that year shall be for business purposes only. The local arrangements shall be under the direction of the Executive Committee of The Canadian Medical Association, which may enlist the assistance of the Branch Association or Division or one of its component societies. The Canadian Medical Association assumes full control of the proceedings of the meeting and of all financial obligations save entertainment."

### MEMBERSHIP

Medical practitioners in good standing resident in Canada may become members of the Canadian Medical Association in one of two ways:

#### By-Laws, Chapter II, Section 1 — Ordinary Members

Every member in good standing in a Division shall be automatically an Ordinary Member of the C.M.A. on payment of the annual fee as levied by the General Council.

#### By-Laws, Chapter II, Section 2 — Members-at-Large

Any graduate in medicine residing in Canada who is not a member of a Division may be accepted as a member of the C.M.A. provided that, with his application, a certificate of approval from the Executive body of the Division in which the applicant resides, be furnished to the General Secretary. In the case of an applicant residing in Canada in a territory beyond the jurisdiction of a Division the applicant must be endorsed by two members of the C.M.A. Such members shall be designated Members-at-Large and shall pay the annual fee as levied by the General Council.

### CONCLUSION

The foregoing extracts from the By-Laws, read in conjunction, make it clear that, applicable to all of Canada save that portion which is outside the jurisdiction of any province, all members of the Canadian Medical Association, whether ordinary members or members-at-large, must have the sanction of the Division in which the member resides.

Only members of the Canadian Medical Association may register at a meeting of the Canadian Medical Association and attend sessions.

The annual meeting of the Division which may be held at the same time and place as the annual meeting of the Canadian Medical Association is for business purposes only; and, as this meeting is entirely separate and distinct from the annual meeting of the Canadian Medical Association, membership in the Division only qualifies for registration to attend the business meeting of the Division.

## Amendment to Constitution and By-Laws

In order to make provision for alternates for elected members of the Executive Committee, the Committee on Constitution and By-Laws will move the following amendment to the By-Laws at the next meeting of General Council which will be held in Winnipeg on June 23 and 24, 1941. This second Notice of Amendment is published in the *Journal* in compliance with the By-Laws (Chap. XII, Sect. 2).

Chapter VI, Section 2—Duties of Nominating Committee.—Paragraphs 2 and 3 now read as follows:

- (2) Nominations of an Executive Committee which, in addition to those who are members *ex officio* (See Chapter VIII, Section 4), shall consist of thirteen members drawn from General Council and geographically distributed as follows: three shall be resident in each province in which an office of The Association is located and one shall be resident in each of the other provinces. At its session, the Nominating Committee may receive in writing a Division's official nomination of the candidate or candidates for representation on the Executive Committee to which the Division is entitled. In the event of an official nomination being rejected by the Nominating Committee the reasons for such action shall be incorporated in its report to General Council.
- (3) *Rules of Procedure:* The Committee shall be called to order by the President as Chairman of the Committee. In the absence of the President the General Secretary shall convene the Committee and request the Committee to select, by open vote, the Chairman. The Committee shall then proceed to carry out its duties by open vote. In case of a tie vote the Chairman shall have the casting vote in addition to the vote to which he is entitled as a member of the Committee. When called for, the report of the Committee shall be presented to the General Council by the General Secretary.

The above-mentioned paragraphs shall be amended to read as follows:

- (2) Nomination of an Executive Committee which, in addition to those who are members *ex officio* (See Chapter VIII, Section 4) shall consist of thirteen members drawn from General Council and geographically distributed as follows: three shall be resident in each province in which an office of The Association is located and one shall be resident in each of the other provinces.
- (3) Nomination from members of General Council of nine alternates for the elected members of the Executive Committee. There shall be one alternate nominated from each province. The function of the alternates shall be to act in the place of an elected member of the Executive Committee who is absent because of death or illness or from cause acceptable to the President.
- (4) At its session the Nominating Committee may receive in writing (1) each Division's official nomination of the candidate or candidates for representation on the Executive Committee to which the Division is entitled, and also (2) each Division's official nomination of one alternate who will act in the absence by reason of death or illness or from cause acceptable to the President of the member or one of the members representing that Division. In the event of such an official nomination by a Division being rejected by the Nominating Committee the reasons for such action shall be incorporated in its report to General Council.
- (5) Rules of Procedure—(unchanged except that paragraph is renumbered.)

#### THE NOBLE NATURE

It is not growing like a tree  
In bulk doth make man better be;  
Or standing long an oak, three hundred year,  
To fall a log at last, dry, bald, and sere:

A lily of a day

Is fairer far in May,

Although it fall and die that night;  
It was the plant and flower of light;  
In small proportions we just beauties see;  
And in short measures life may perfect be.

—BEN JONSON.

## The War

### Three Hundred and Fifty Canadian Doctors are Required During the Next Year for Military Service

The Association is authorized by the military authorities in Ottawa to say that medical officers for the Canadian Navy, Army and Air Force are needed now, and it is anticipated that 350 will be required during the coming year. So far, and without any direct appeal having been made, the medical profession of Canada has responded well, in that approximately one-tenth of its number, namely more than 1,200 doctors are already in active military service.

It is appreciated that essential Dominion, Provincial, Municipal and civilian requirements must, as far as possible, not be embarrassed. However, the needs of the military services must be met and these may be classified for the next year's requirements into the following groups:

1. For service in Canada—These may be in medical category "A", "B" or "C" and in this class can be considered those over 40 years of age. Approximately 140 additional of these will be required.
2. For overseas service—These should be in category "A" and preferably under 40 years of age. About 210 of such will be required.

No promise can be held out to any officer of definite appointment to overseas service, nor must there be any strings attached to the offer of service, although we are assured by the military authorities that every effort will be made to see that proper recognition is made of every man's qualifications and that he is used to the best advantage. It must be recognized that care is necessary with regard to the selection of specialists according to the requirements of the services at any one given time.

All medical men who are desirous of offering their services should immediately contact one of the senior medical officers of the Services in the District in which they reside. If preferred, communications may be addressed to the General Secretary of the Canadian Medical Association, 184 College Street, Toronto, who will be glad to put the applicant in touch with the proper authorities.

T. C. ROUTLEY.

### The Third Canadian Division Medical Society

On November 20, 1940, the Medical Officers of the 3rd Canadian Division at Debert Military Camp met in the Officers' Mess of the 23rd Field Ambulance for the purpose of organizing a Medical Society.

The following officers were elected to act as executive and program committee: *President*—Lt.-Col. E. F. Ross; *Vice-president*—Capt. J. A. Wright; *Secretary*—Capt. G. C. Large.

Meetings of this, the 3rd Canadian Division Medical Society, have been held every two weeks and have proved to be of inestimable help in promoting the discussion and clarification of our many problems incidental to our new work. It has served to link a group of officers drawn from Coast-to-Coast into a more perfect functioning military group and will serve as the medium through which we will be able to keep in touch with current medical literature and the changes in civilian practice.

It is only through mutual study and discussion of our present problems, and, at the same time, a constant knowledge of new changes and advances in civilian medicine that we can hope to ensure the success of our present endeavour and of our future. As a means to this end, this medical society we feel will be of invaluable aid. Since our organization the meetings have been well attended and many excellent papers given, some on problems of a purely military medical nature, others on non-military subjects. Guest speakers have been: Major Stirrett, of the 3rd Division Engineers, who spoke on the duties of medical officers as seen through the eyes of a combatant officer; Capt. Gibson who gave us a very instructive paper on recent advances in the prevention and treatment of gas casualties, with demonstration of the equipment used.

Our own members have provided us with many interesting evenings and our last meeting was addressed by Major T. Brown, D.A.D.M.S., 3rd Division, recently returned from England.

The members of the 3rd Division Medical Society are: Colonel L. H. Leeson, E.D., A.D.M.S., 3rd Canadian Division; Lt.-Cols. M. D. Graham and E. F. Ross; Majors H. C. S. Elliot, H. L. Logan and K. C. Butler; Captains J. F. Nicholson, A. D. MacDonald, G. P. Tanton, R. M. Caldwell, H. J. Townsend, M. J. Howard, P. A. Belanger, H. R. Rabb, G. C. Large, R. J. Hitesman, F. G. Ramsay, J. A. Wright, G. A. Montemurro, J. A. Noble, G. F. Hamilton, C. W. Procunier, L. W. M. Freele, J. Balfour; Lieuts. B. F. Anderson, E. A. Willis, J. W. Barr, W. H. Rose.

#### New Regulations Relative to Patients Proceeding to the United States for Medical Treatment

It is imperative that Canada conserve her foreign exchange for essential war services and supplies. With that end in view the Government has prohibited Canadians spending foreign exchange in the United States for other than reasons of business, education or health; and in each instance, permission must be secured from the Canadian authorities.

With respect to applications based upon an alleged need to leave Canada to obtain medical treatment, the Canadian Medical Association,

after careful consideration, has advised the Foreign Exchange Control Board that the medical profession of Canada is capable of rendering all necessary care to Canadian citizens. We are now advised that the Government has accepted our statement as part of its policy, and in future permission will be granted only in rare and exceptional circumstances to Canadians to proceed to the United States for medical treatment; that is, only where the medical evidence as to the condition of the applicant proves conclusively that it is absolutely essential for him or her to leave Canada for such treatment.

The form of application and medical certificate previously provided by the Board for use in these cases is being replaced by new forms which will shortly be available. [These can now be obtained from the banks, Ed.] The application by the patient to the Foreign Exchange Control Board is a separate document. In it he will state the reasons why he wishes to leave Canada and give the name and address of his own doctor. The applicant's bank will then send to the doctor a form of medical report which he will fill out after an examination of the patient, and which the doctor will forward direct to the Board at Ottawa. It will, therefore, not be necessary for the patient to see the report nor to know what is being confidentially communicated by the doctor to the Foreign Exchange Control Board. Moreover, the present certificate which required the doctor to make a recommendation has been found embarrassing and, it is thought, unnecessary. Instead, the doctor will be asked to report only on the actual condition and past history of the patient and, from such evidence, the decision of the Board, based upon advice from the medical officers of the Department of Pensions and National Health, will be made.

When and if a patient speaks to you about proceeding to a foreign country for medical advice or treatment, you will no doubt point out to him that travel permits are granted in such cases only in rare and exceptional circumstances, and unless, in your own view, such circumstances do exist, the result should be that the patient would not even make an application to the Board. If, however, the patient does proceed with an application to the Board, there will be no need for you to make a recommendation on the subsequent medical report unless you yourself are strongly of the opinion that the patient must leave Canada to secure adequate medical treatment.

Every loyal Canadian has a part to play in this emergency. There can be no question that the medical profession of Canada will willingly and whole-heartedly, make every contribution within its power to Canada's war effort.

T. C. ROUTLEY.

## War Literature

### BRITISH JOURNAL OF OPHTHALMOLOGY

The Measurement of Heterophoria, N. Cridland, 1941, 25: 141.

### THE BRITISH MEDICAL JOURNAL

The Recruit's Heart, E. N. Chamberlain, 1941, 1: 354.  
Glycerine-sulfonamide Paste for Burns, J. M. Robson and A. B. Wallace, 1941, 1: 469.  
Digestive Disorders in the Forces, J. G. Graham and J. D. O. Kerr, 1941, 1: 473.  
Treatment of Burns (leading article), 1941, 1: 484.  
Problems of War Casualties (medical society meeting), 1941, 1: 490.  
Dyspepsia in the Forces (Meeting, Royal Soc. of Med.), 1941, 1: 529.  
Effort Syndrome in Soldiers, John Parkinson, 1941, 1: 545.  
Clinical Investigation of Shock, Adrian C. Kanaar, 1941, 1: 549.  
Problems in Wound Healing (leading article), 1941, 1: 560.

### CANADIAN MEDICAL ASSOCIATION JOURNAL

War Wounds, W. E. Gallic, 1941, 44: 338.  
Emphysema under the Age of Forty, P. M. Andrus, 1941, 44: 344.  
Psychological Factors in Aviation, M. R. Harrower-Erickson, 1941, 44: 348.

### THE LANCET

Neurosis as viewed by a Regimental Medical Officer, A. D. Leigh, 1941, 1: 394.  
The Prevention of Gas Gangrene (leading article), 1941, 1: 419.  
Tuberculosis and War (leading article), 1941, 1: 483.

### RADIOLOGY

Wartime Military Roentgenology, A. A. DeLorimier, 1941, 36: 391.

### BOOKS AND PAMPHLETS

Economy in the Use of Drugs in War-time. H. M. Stationery Office, York House, Kingsway, London. Price 3d.  
Fractures and other Bone and Joint Injuries. R. Watson-Jones, 2nd edit. Macmillans, Toronto, 1941. Price \$15.00.  
Report of the Blood Transfusion Association. The Blood Transfusion Association, 2 East 103rd St., New York, N.Y., 1941.  
Scabies—Civil and Military. Reuben Friedman, Froben Press, New York. Price \$3.00.

### My England!

(Song: Dedicated to The Canadian Legion)

I long to go to England,  
The Homeland of the Free.  
There would I see green Runnymede,  
The Isle of Liberty.  
For there my fathers won from John  
The Charter of our rights,  
And spread them o'er a hundred lands  
And through a thousand fights.

I want to stand with England  
When all the heathen rage  
Against the God of Freedom,  
And human heritage,—  
The rights of man, and love, and home,  
The old Chivalric Code;—  
She stands with every Spartan  
At the Keeping of the Road.

With her still rides the Silent Prince  
And Henry of Navarre,  
And Winkelried still clasps the spears,

And Nelson breaks the bar.  
Who would not fight for England,  
Where she would die for me?—  
Undaunted in a broken world,  
The hope of all the free.

Mine are the folk of England;  
The Roman and the Gaul,  
The Saxon and the Norman;—  
United now are all.  
There would I hear our language,—  
The speech of all,—that sprung  
From universal usage  
To universal tongue.

Where French and Danish mingle  
With Roman, Scot and Greek,  
And Pentecostal peoples  
Know what their brothers speak.  
I hear their ancient voices  
From many a stately hall.  
Inviolable they keep the vales,  
And unto me they call!

—W. D. LIGHTHALL, F.R.S.L.,

Founder of the Canadian Legion.

Montreal, January 31, 1941.

## Medical Societies

### The Academy of Medicine, Toronto

The thirty-fourth annual meeting of the Academy of Medicine, Toronto, was held in Osler Hall, 13 Queen's Park, on May 6, 1941. The report of the Honorary Secretary, Dr. E. W. Mitchell, showed the total number of Fellows to be 1,178, of whom 116 are on active service with His Majesty's forces.

The reports from the various officers and committees reviewed the many activities of the past year. The library now contains 29,586 volumes, an increase of 640 for the past year. The Academy appreciates gifts from its own Fellows and from friends interested in its endeavour to build up a worth-while medical library and museum. The Council of the Academy, in co-operation with the Library Committee, is helping to provide medical libraries for overseas medical units recruited from the Toronto district, and contributions of money have already been sent to purchase medical books and periodicals for the use of Canadian medical units in England.

The Academy was fortunate in hearing addresses from a number of distinguished visiting physicians and surgeons from Canada and the United States. Very interesting and varied programs were presented at the stated, special and sectional meetings, and subjects of interest to the profession and public alike were discussed.

Dr. William Magner, the retiring President, was highly complimented on his successful year in office.

The election of new officers and members of Council resulted as follows:

*President*—Dr. Charles J. Copp; *Vice-president*—Dr. Samuel Johnston; *Honorary Secretary*—Dr. E. W. Mitchell; *Honorary Treasurer*—Dr. Roy H. Thomas; *Members of Council*—Drs. William Boyd, W. A. Burr, Gordon C. Cameron, C. E. Cooper Cole, E. Davidson, G. J. Gillam, Charles Harris, R. I. Harris, I. D. Kitchen,



P. A. Sarjeant, James Simpson, E. G. Wheeler. *Chairmen of Sections: Medicine*—Dr. H. G. Hall; *Surgery*—Dr. C. B. Parker; *Pathology*—Dr. I. H. Erb; *Ophthalmology*—Dr. J. F. A. Johnston; *Preventive Medicine and Hygiene*—Dr. Gordon Bates; *Pædiatrics*—Dr. G. P. Hamblin; *Obstetrics and Gynæcology*—Dr. D. Nelson Henderson; *Otolaryngology*—Dr. H. M. Brown; *Anæsthesia*—Dr. R. H. Meredith; *Urology*—Dr. C. R. B. Crompton; *Neurology and Psychiatry*—Dr. Mary Jackson.

E. W. MITCHELL,  
Honorary Secretary.

### The Calgary Medical Society

At the annual meeting of the Calgary Medical Society, held April 15, 1941, the following officers were elected for 1941-1942: *President*—Dr. L. M. Mullen; *Vice-president*—Dr. F. Pilcher; *Secretary*—Dr. R. G. Townsend; *Treasurer*—Dr. J. V. Follett; *Librarian*—Dr. R. R. Hughes; *Executive Committee*—Drs. W. A. Lincoln, A. E. Fettes, and Ivan Dixon.

G. E. LEARMONTH

### The Saint John Medical Society

The regular monthly meeting of the Saint John Medical Society was held at the Admiral Beatty Hotel on April 29, 1941. Major F. C. Jennings, No. 7 District, R.C.A.M.C., was the special speaker. He discussed Army Hygiene and presented a statistical study of the epidemic diseases in this district with particular reference to the influenzal epidemic earlier in the winter. As usual the discussion following the paper was of an interesting and informative nature.

### La société médicale des hôpitaux universitaires de Québec

Une séance de cette Société eut lieu à l'Hôtel-Dieu de Québec, le 7 mars 1941.

Suivent les résumés des travaux présentés.

#### UTILITÉ DE L'EXAMEN COPROLOGIQUE DANS LE DÉPISTAGE DES PARASITOSEs INTESTINALES.—H. MARCONX.

L'examen microscopique entre lame et lamelle des matières fécales de 164 malades de l'Hôtel-Dieu de Québec a permis de découvrir des parasites chez 62 d'entre eux, soit un pourcentage de 37.8.

Le relevé des examens coprologiques faits dans un but général donne les chiffres suivants:

		pourcentage
<i>Spirilles</i> .....	16	9.7
<i>Entamæba coli</i> .....	19	11.5
<i>Endolimax nana</i> .....	1	0.6
<i>Amibes non nommées</i> .....	2	1.2
<i>Enteromonas hominis</i> .....	2	1.2
<i>Chilomastix mesnili</i> .....	1	0.6
<i>Trichomonas intestinalis</i> .....	1	0.6
<i>Giardia intestinalis</i> .....	12	7.3
<i>Diphyllobothrium latum</i> .....	1	0.6
<i>Ascaris lumbricoides</i> .....	1	0.6
<i>Enterobius vermicularis</i> .....	2	1.2
<i>Blastocystis hominis</i> .....	20	12.1

Ces malades avaient été hospitalisés dans les services de médecine, de chirurgie et de dermatologie pour troubles gastriques, hépatiques, intestinaux, asthénie, dermatoses, etc.

### INDICATIONS DE LA RÉSECTION-TRANS-URÉTRALE DE LA PROSTATE.—Arthur Bédard.

La résection trans-urétrale utilisée surtout depuis 1931, d'abord aux États-Unis, puis dans tous les pays, a modifié considérablement la chirurgie de la prostate. Deux appareils sont surtout employés: Le Braseh-Bumpus-Thompson punch et le resecteur de Stern-MacCarthy.

Il importe, avant de décider une résection, de faire un bon diagnostic en employant tous les moyens nécessaires: interrogatoire soigné, toucher rectal, urétroscopie et cystoscopie. Il faudra de plus, bien examiner son patient et, ici comme dans la prostatectomie, il faut une collaboration médico-chirurgicale.

Les indications varient suivant les auteurs. Tous sont d'accord pour accorder la préférence à la résection dans les maladies du col. Dans le cancer de la prostate, quoique la résection ait de nombreux adeptes, la prostatectomie suspubienne et mieux la prostatectomie par voie périnéale, gardent encore leurs indications.

Dans l'hypertrophie de la prostate, en règle générale, l'expérience, l'habileté et l'entraînement de l'opérateur, régleront les indications de la résection endo-urétrale. Dans certains cas: lobe médian seul, ou associé à une hypertrophie légère des lobes latéraux, petits lobes latéraux ou petit adénome isolé, on doit préférer la résection. Au contraire, dans les grosses hypertrophies des lobes latéraux, dans l'hypertrophie intra-vésicale ou avec prolongement sur la base de la vessie, la prostatectomie garde encore ses indications.

La préparation du malade à la résection devra être aussi soignée que dans la prostatectomie. Les soins post-opératoires seront très vigilants. En prenant toutes ces précautions on évitera les complications dont les plus fréquentes sont: l'hémorragie, l'infection; et l'incontinence.

Quant aux résultats, ils sont en général excellents, et ils seront tant au point de vue mortalité qu'au point de vue fonctionnel, en rapport avec l'expérience et l'habileté de l'opérateur.

### LES MASTOÏDITES.—P. Painchaud et F. Letarte.

Vingt-trois cas de mastoïdites aiguës ont été traités chirurgicalement depuis novembre 1939. La classification des observations est basée sur la systématisation cellulaire de la mastoïde; 13 cas d'abcès sous-périosté; deux mastoïdites de Bézold; huit périnusites (sinus sygmoïde). Trois observations-types illustrent la symptomatologie de chaque groupe.

La technique des temps opératoires est résumée; elle souligne l'importance de l'exposition du sinus et de la dura-mère selon les éventualités.

Les prélèvements au niveau de la mastoïde ont décelé la présence du streptocoque hémolytique dans 70 pour cent; du pneumocoque dans 18 pour cent; du staphylocoque dans 12 pour cent. La thérapeutique post-opératoire des sulfamidés est prescrite d'après le résultat bactériologique. La dose moyenne pour chaque malade n'a pas dépassé 12 grammes. Un seul cas a manifesté des signes fugaces d'intolérance. Tous les patients ont guéri sans complication. Un cas de paralysie faciale périphérique, d'origine otogène, est en voie de guérison.

La durée de l'hospitalisation chez ces malades, âgés de 16 mois à 66 ans, inclusivement, représente une moyenne de 14½ jours, pour le traitement chirurgical de leur mastoïdite.

### CONSIDÉRATIONS SUR 40 OPÉRATIONS DE CATARACTE SÉNILE.—Jean Lacerte and Emile Pelletier.

Nous vous avons présenté 40 cas de cataracte sénile opérés à l'Hôtel-Dieu de Québec, de juin 1938 à mars 1941. Nous avons fait 27 cas d'extraction intra-capsulaire et 13 cas d'extra-capsulaire. Nos malades sont âgés de 48 à 88, dont 22 femmes et 18 hommes. Nous avons voulu faire ressortir les avantages de l'extraction intra-capsulaire en insistant sur le fait



qu'il est possible avec cette méthode d'opérer la cataracte sans attendre sa maturité complète, en faisant remarquer que les suites opératoires sont plus simples par le fait qu'il ne se produit pas de cataracte secondaire ou d'iritis. La vision est excellente dès le premier jour et restera telle pour toute la vie du malade, tandis qu'avec une extraction extra-capsulaire, la vision aura tendance à diminuer à cause de la cataracte secondaire.

Une séance de la Société eut lieu à la Crèche St-Vincent de Paul, le 21 mars 1941.

#### OPHTALMIE PURULENTE DES NOUVEAU-NÉS. — François Letarte.

Définit l'infection de la muqueuse conjonctivale par le gonocoque et les complications oculaires secondaires. Apparaît entre les 30 et 50 jour chez le nouveau-né. Si l'incidence a diminué, elle est responsable, aux Etats-Unis, de 30 pour cent des enfants aveugles. Dans la province de Québec, 35 cas ont été déclarés en 1939 aux statistiques fédérales. Ici, à la crèche, 4 nouveau-nés de l'extérieur ont été traités après confirmation des examens bactériologiques.

Notre travail a pour but de considérer le tableau de la forme moyenne; les conditions pathologiques de la cornée; un aspect de la prophylaxie; enfin, la thérapeutique actuelle. En présence du rôle joué par les sages-femmes, les règlements du Central Midwives Board of England sont résumés pour éclairer la prophylaxie de notre milieu.

Les moyens thérapeutiques sont synthétisés: techniques et chimiothérapie. Administration de Dagenan dans les biberons et lavages au streptocide et Solu-Dagenan.

Pronostic: pas de séquelle cornéenne; guérison après 6 jours.

#### FIÈVRE ONDULANTE ET NÉPHRITE CHRONIQUE INTRINÈQUE.—D. Lapointe.

Le dépistage de la fièvre ondulante n'est pas toujours facile chez le nourrisson surtout lorsque la maladie se trouve associée à une néphrite comme ce fut le cas chez l'enfant présentée.

Une enfant de quatorze mois très hypotrophique en impose tout d'abord pour une pyélonéphrite. Au cours du traitement de l'infection urinaire, les modifications de la courbe de poids jointes à la notion de l'emploi du lait cru dans l'alimentation de l'enfant depuis l'âge de quatre mois font songer à la possibilité d'une fièvre ondulante qui fut d'ailleurs mise en évidence par un séro-diagnostic de Wright. La petite malade guérit de sa fièvre ondulante à la suite d'injections de vaccins mais l'azotémie demeure élevée.

Il ne fait aucun doute que la fièvre ondulante a favorisé l'infection urinaire entraînant des lésions rénales suffisantes pour causer de l'infantilisme et du rachitisme rénal.

#### CONSIDÉRATIONS SUR L'ANALGÉSIE OBSTÉTRICALE. —René Simard.

De nombreuses méthodes d'analgésie obstétricale ont été préconisées, mais aucune à date, ne s'est montrée sans défaut. L'administration de nembutal et de scopolamine, telle que recommandée par Irving, a été mise à l'épreuve à la Miséricorde. Une excitation importante s'est produite chez 80 pour cent des parturientes ainsi traitées. On a tenté de remédier à cette excitation par l'administration soit de sulfate de magnésie, soit de strychnine, mais sans succès. L'emploi de nembutal durant le travail, procédé d'amnésie efficace et peu dangereux, n'est cependant guère pratique.

#### UNE ÉPIDÉMIE DE DYSENTÉRIE À FLEXNER CHEZ L'ENFANT.—Euclide Déchène.

Nous avons eu l'opportunité d'observer, à la Crèche St-Vincent de Paul de Québec, une épidémie de dysentérie à bacille de Flexner chez de jeunes enfants. C'est un fait digne de mention dans un milieu infantile. Tout un étage, c'est-à-dire 141 enfants de 6 mois à 2 ans sont atteints d'une diarrhée muco-glairo-sanguinolente associée à un syndrome de deshydratation et ultérieurement d'intoxication. Le laboratoire confirme le diagnostic clinique par l'examen des selles et par l'agglutination positive au Flexner à un taux supérieur au 1/100. L'épidémie dura deux mois. Parmi les 141, 21 furent sévèrement atteints, 17 moururent. Ce furent les débiles, les prématurés, les rachitiques, les hypotrophiques qui payèrent le plus lourd tribut à la mortalité. Quelle fut la source? Une porteuse de germes positives à Flexner.

Le traitement fut le suivant: pas de vaccin ni sérothérapie à cause de leur peu d'efficacité dans les métadysentéries. Nous nous contentâmes de réhydrater les enfants par toutes les voies possibles, au besoin par la phlébotomie. Au point de vue alimentaire: la pectine-agar avec dextrin-maltose nous donna les meilleurs résultats. Quelques semaines plus tard, cinq nouveaux enfants plus vieux tombent malades. Le Flexner est identifié chez l'un d'eux. Ils recevaient du sulfonamide. Dès la troisième journée, la température est tombée et leur état général est de beaucoup meilleur. Naturellement, le nombre de cas traités, est trop restreint pour en tirer des conclusions. Des travaux américains sont en cours sur le traitement de la dysentérie par les sulfamides. Ces derniers deviendront, sinon le médicament de choix, du moins un adjuvant très utile dans le traitement de la dysentérie à Flexner.

#### La Société Médicale de Montréal

La Société Médicale de Montréal tenait, le 4 mars 1941, à l'Institut du Radium, une séance clinique consacrée au cancer.

La présentation des travaux fut suivie d'une discussion générale, au cours de laquelle on se rendit compte qu'il y aurait lieu d'intensifier la lutte contre le cancer au Canada, particulièrement à Montréal.

À la fin de cette séance, le Dr Paul Letondal, appuyé par le Dr Albert Bertrand exprima, au nom de la Société, le vœu suivant, qui fut adopté à l'unanimité:

"Attendu que le cancer est une des causes les plus importantes de mortalité;

"Attendu que le nombre des cas de cancer est de plus en plus considérable au Canada, particulièrement à Montréal;

"La Société Médicale émet le vœu que soit intensifiée la lutte contre le cancer dans notre ville, en multipliant les cliniques anticancéreuses; en faisant davantage l'éducation du public; enfin, en facilitant le diagnostic précoce du cancer aux médecins praticiens, grâce à des examens de laboratoire gratuits, mettant ainsi à la portée de tous les avantages de la biopsie."

Plus d'une centaine de médecins assistaient à cette séance de la Société Médicale consacrée entièrement aux méthodes modernes de diagnostic et de traitement du cancer.

Le Secrétaire,  
PAUL LETONDAL.

## University Notes

### Dalhousie University

With 42 men graduating, the Dalhousie Medical School passed on to the degrees of M.D. and C.M. her full final year class. It was the first time in six years the ranks had been unbroken. The high requirements of the University medal were not met and it went unawarded.

Coming winded from their final year internships and their combined Dalhousie-Provincial Medical Board examinations, the graduates found the proximity of the Dominion Council tests awesome, and less than half of the usual high percentage attempted them.

As their paths separated on Convocation day five were heading directly for duty in the services. Two of these were of the small United States group and were reporting to President Roosevelt's army.

## Abstracts from Current Literature

### Medicine

**En Marge du Tubage duodenal.** Leblond, S.: *l'Union Médicale du Canada*, 1941, 70: 233.

In the medical service of the Saint-Sacrement Hospital at Quebec the average of duodenal intubations since 1931 has been one a day. In recording typical cases of intubation the author details successively with the technique, the therapeutical indications, and the advantages of biliary drainage through the medium of Einhorn's tube.

The object of intubation is the examination of the different types of bile, principally bile B, for the purposes of diagnosis and treatment. Under the influence of a chemical stimulation of the duodenal mucosa the gall bladder discharges this bile B, darker in colour than biles A and C, which its function is to concentrate. A biliary biopsy makes up for the lack of a positive x-ray examination.

Those harbouring calculi have no bile B, at least in the generality of cases. On the other hand, in the case of those with spastic gall bladder and those who exhibit the symptoms of atony of the bladder intubation combined with hygienic measures and suitable diet is a common form of treatment.

The author emphasizes the value of the amounts of cholestérine obtained in the course of intubation for the estimation of hypercholesterinæmia even in those who have no stone. One may then ask "why this elevation of the amount of cholestérine should not manifest itself in a clinical syndrome yet to be described". In his opinion atony of the gall bladder is only a manifestation of the clinical syndrome of

hypercholesterinæmia. It would seem that the author has concentrated on this interesting point in a subject already fully considered both by clinicians and medical commentators.

PIERRE SMITH

### Surgery

**The surgical treatment of gastro-jejuno-colic fistula.** "Le traitement de la fistule gastro-jéjunocolique". Pfeiffer, D. B.: *Surg., Gyn. & Obst.*, 1941, 72: 282.

Une méthode pour le traitement de la fistule gastro-jéjunocolique, qui avait fait l'objet d'un rapport à l'*American Surgical Association* en mai 1938 est basée dans le présent article sur l'étude de 15 cas.

Ces cas réunis par Pfeiffer et rapportés par lui et par d'autres membres de l'A.S.A. enrégistrent 14 guérisons, 1 décès. Dix d'entre eux ont été traités par résection gastrique à la suite d'une colostomie préliminaire, cinq par simple restauration.

V.G.—*Cas 10* (Dr A. W. Allen)—H., âgé de 56 ans, avait eu une gastro-entérostomie 10 ans auparavant. La diarrhée et les symptômes typiques d'une fistule gastro-jéjunocolique étaient présents. Le patient avait perdu 30 livres. Le 14 décembre 1939 une colostomie droite fut faite. L'état général du patient en fut très amélioré quoique le gain de poids (3 livres) n'ait pas été frappant. Le 6 janvier 1940 une gastrectomie subtotale fut faite avec transection et anastomose à la fois du jéjunum et du colon. Un rétablissement rapide et sans incident survint. En six semaines un gain de 27 livres fut obtenu. Le colon s'est fermé et le patient est en excellente santé.

Résumant son point de vue, l'auteur conclut que: (1) Les conséquences les plus sérieuses de la fistule gastro-jéjunale surviennent plus, par le reflux de matières intestinales dans l'estomac et le jéjunum que par le passage des aliments de l'estomac à travers la fistule. (2) Une colostomie pratiquée près de la fistule est le meilleur moyen d'atténuer les symptômes et de faciliter le recouvrement des forces du malade. (3) Une colostomie préliminaire permet une excision subséquente de la fistule par des mesures radicales nécessaires dans un terrain nettoyé et protège la cicatrisation de la suture pratiquée au niveau du colon. (4) La mortalité opératoire 6.6 pour cent est grandement réduite par ce procédé.

PIERRE SMITH

**Tuberculous Cervical Lymphoma.** Wulff, H. G.: *Acta Chirurg. Scand.*, 1941, 84:

The author classifies these into the usual, as previously defined by Keinbock and others: Group I—simple solitary enlargement without periadenitis or liquefaction; Group II—several or numerous nodes with periadenitis and with or without liquefaction; Group III—those with fistula or scrofuloderma. Two hundred and thirty cases are reported upon, 105 treated by surgery and 125 radiologically. Group I, composing 20 per cent of the cases received equally

good results by either method. Group II, 70 per cent, showed by surgical methods 81 per cent cured, 4 per cent improved, 13 per cent relapses; by radiological methods 60 per cent cured, 13 per cent improved, 25 per cent relapses. The conclusion reached is to employ surgical means except in those far advanced in this class when radiology is given with later surgical ablation. Group III by surgical measures showed 54 per cent cured, 18 per cent improved, 18 per cent relapses; by radiological means, 71 per cent cured, 14 improved, 14 relapses. The advantages of surgery are the rapidity of result with the disadvantages of unsightly scar, hospitalization and risk of nerve (3 per cent) and vein injury. The advantages of radiological therapy are that it is ambulatory and skin changes are slight but the time factor ranged from 10 months to 5 years. None of the other methods of therapy such as heliotherapy are assessed.

F. S. DORRANCE

**La Gastrectomie.** Dufresne, R. R.: *l'Union Médicale du Canada*, 1941, 70: 287.

Gastrectomy has of late years taken the first place in the surgery of two great disorders of the stomach and duodenum—cancer and ulcer. Formerly gastro-enterostomy represented the triumph of surgery in the matter of ulcer. A fair number of surgeons today still adhere to this simple procedure, which they consider is easy to perform and assures a cure in the majority of cases. On the other hand, at the moment, the partisans of gastrectomy seem to have the upper hand. These hold that systematic gastro-enterostomy is a poor operation, frequently followed by relapses, and in the end demanding more radical operation, which then must be performed under poorer conditions. Gastrectomy in their opinion would be the operation of choice when one has to relieve obstruction in spite of metastases, and if a radical cure is possible the wide extirpation and removal of all the regional lymph-nodes should be practised in all those patients whose general condition permits of such an extirpation. Surgical treatment of an ulcer should aim at eliminating the ulcer, the segment which carries it, and the acid-producing zone; then resecting three-quarters or four-fifths of the stomach, having in mind that the degree of acidity after operation will as a rule be less, recurrences will be less frequent, and the well-being more complete than with more conservative procedures. Nor will one have to be unduly anxious about the effect of a wide gastrectomy on the digestive functions and the hæmatopoiesis of those thus treated, diet and the resources of the duodenum and intestines coming to the aid of the organism. The success of this bold and dangerous manœuvre depends on the collaboration of the physician and surgeon both before and after the operation.

YVES CHAPUT

## Obstetrics and Gynecology

### Edema in Pre-eclampsia and Eclampsia.

Dieckmann, W. J. and Kramer, S.: *Am. J. Obst. & Gyn.*, 1941, 41: 1.

The following physiological changes occur in normal pregnancy: (1) the venous pressure in the legs is increased and causes an increased loss of fluid from the blood into the tissues of the legs; (2) there is increased capillary permeability; (3) the elimination of water and solids by the kidney is delayed or impaired; (4) the average serum protein concentration is 6.5 g. per cent; (5) the average colloid osmotic pressure of the serum protein is 28.7 cm. of water. Pre-eclampsia and eclampsia may occur if these changes are of greater magnitude than normal, or if they are exaggerated, by internal or external factors. Thus we find in these diseases the following: (1) Greater alterations than normal in the venous and capillary pressures and capillary permeability. (2) The average serum protein concentration in edematous patients with pre-eclampsia is 6.22, with eclampsia it is 6.7, and with vascular renal disease and normal renal function it is 6.67 g. per cent. (3) The average colloid osmotic pressure of edematous pre-eclamptic patients is 24.9 and of toxæmic patients without edema it is 26.5 cm. of water. (4) The retention of sodium, chlorine and water is greatly increased in some pregnant patients, resulting in an abnormal gain in weight, and finally in demonstrable edema. (5) Changes in the concentration of the female hormones are apparently associated with edema, but whether this is the cause or the result cannot be stated from our present knowledge. (6) The prevention and treatment of edema are dependent on the limitation in the diet of the principal components of edema fluid; namely, sodium chloride and water. The curtailment of sodium chloride in the diet presents fewer difficulties and causes less discomfort to the patient than the restriction of water.

ROSS MITCHELL

### Eclampsia: A Clinical and Biochemical Study.

Part II Biochemical Investigation of Eclampsia. (Part I was published in the June issue). Mudaliar, A. L. et al.: *J. Obst. & Gyn. of the Brit. Emp.*, 1940, 47: 404.

Artificial rupture of membranes has a very definite place in the treatment of eclampsia. In this series the mortality was lowered from 16.7 to 8.7 per cent.

It is suggested that eclampsia may be divided into renal, hepatic and mixed types.

Hepatic eclampsia is rare, but much more fatal than the other varieties. An attempt by biochemical investigations to separate these entities has shown that: hypoglycæmia is marked in the fatal cases, suggesting intravenous glucose therapy; increase of inorganic phosphorus, uric acid, creatinine and magnesium are of grave prognostic significance; there is an increase of

the total bases in the blood and so alkalis should be carefully administered; calcium behaves normally.

Hepatic eclampsia differs from the renal type in that there is an increase of magnesium, phosphorus, cholesterol and uric acid, with a practically normal blood-urea and urea-clearance.

The urea-clearance value is very much diminished in the fatal and renal types of eclampsia.

P. J. KEARNS

**An Investigation into the Results of Operation in Genital Prolapse.** Stallworthy, J.: *J. Obst. & Gyn. of the Brit. Emp.*, 1940, 47: 391.

A historical survey is given of the evolution of technique in the treatment of genital prolapse and the post-operative results of 285 operations performed 2 to 10 years ago are analyzed. Prolapse recurred in 13 per cent, 22 per cent of these being after parturition. There was no recurrence of prolapse in 58 per cent of the patients who became pregnant after operation and who were delivered vaginally. Stress incontinence of urine and dyspareunia were the most common post-operative complaints, and methods of avoiding them are discussed. When prolapse was confined to one wall of the vagina at the time of operation in 6 per cent of cases a second operation was necessary years later for descent of the opposite wall.

Operative and post-operative mortality was 0.8 and 0.37 per cent in two separate series analyzed. The causes of death and the methods of avoiding them are discussed.

P. J. KEARNS

**Pathology and Experimental Medicine**

**A Statistical Study of Post-operative Venous Thrombosis and Pulmonary Embolism: II Predisposing Factors.** Barker, N. W. *et al.*: *Proc. Staff Meet. Mayo Clinic*, 1941, 16: 1.

The risk of post-operative venous thrombosis and pulmonary embolism, as well as of clinically diagnosable post-operative thrombophlebitis, is somewhat higher in women than men. Post-operative pulmonary embolism, both fatal and non-fatal, is slightly more common in men. The majority of women having these complications are between the ages of forty and fifty-nine years, and the majority of men are between the ages of fifty and sixty-nine. These complications are rare under the age of twenty. There is a tendency for the incidence to increase slightly in the upper age groups. Post-operative venous thrombosis and pulmonary embolism are definitely, although not markedly, more common in obese than in non-obese patients. They are also definitely, although not markedly, more common in patients with blood disease, cardiac disease, disease of the peripheral veins, severe infections or carcinoma than in patients without these conditions. Approximately a third of the patients in the group of 1,665 had none of these predisposing factors.

S. R. TOWNSEND

**A Statistical Study of Post-operative Venous Thrombosis and Pulmonary Embolism. III Time of Occurrence During the Post-operative Period.** Barker, N. W. *et al.*: *Proc. Staff Meet. Mayo Clinic*, 1941, 16: 17.

Cases occurred as early as on the second post-operative day and as late as on the one hundred and fifteenth day; the mean was the twelfth day. The complication occurred during the first eight days in approximately a fourth of the cases, from the ninth to the fourteenth day inclusive in approximately half the cases, and after the fourteenth day in approximately a fourth of the cases. Thrombophlebitis was noted only rarely during the first four days.

Similar data for the occurrence of pulmonary embolism and fatal pulmonary embolism revealed that in approximately a fourth of all the cases the embolism occurred before the seventh post-operative day; in approximately half the cases, from the seventh to the fourteenth day, inclusive; and in approximately a fourth after the fourteenth day. This is also true of the group in which fatal embolism occurred. The earliest fatal case occurred on the first post-operative day and the latest on the fifty-eighth.

Further analysis reveals the following possibilities. (1) If a patient who has had an operation has non-fatal pulmonary embolism he has slightly less than 1:5 chance of subsequent fatal pulmonary embolism; 3:10 of subsequent embolism fatal or non-fatal, and slightly less than 1:2 of some sort of subsequent thrombotic or embolic episode. (2) If all embolisms which were preceded by a clinically diagnosed non-fatal embolism could be prevented the total number of fatal embolisms would be reduced by more than a third.

S. R. TOWNSEND

**A Statistical Study of Post-operative Venous Thrombosis and Pulmonary Embolism. IV Location of Thrombosis: Relation of Thrombosis to Embolism.** Barker, N. W.: *Proc. Staff Meet. Mayo Clinic*, 1941, 16: 33.

The analysis of the statistics in the entire series of cases covered by this study supports the following conception. Post-operative venous thrombosis occurs in episodes and there may be only one episode. If this occurs in a small vein part or all of the thrombus may be detached soon after its formation to become a small (non-fatal) embolus. If it is not detached, or if only part of it is detached, the clinical signs and symptoms of thrombophlebitis develop in the involved vein. A second episode may occur in which the thrombosis propagates into a larger and more proximal vein, and this episode may be characterized by detachment (a larger or fatal embolus), by the development of thrombophlebitis in this vein, or by a small non-fatal embolus and thrombophlebitis. If the first episode of thrombosis occurs in a large vein such as the iliofemoral the first and only signs of its

occurrence may be sudden fatal embolism. Iliofemoral thrombophlebitis may develop which can be recognized clinically, or a small fragment of the thrombus may be detached to form an embolus, and iliofemoral thrombophlebitis may develop.

After thrombophlebitis has developed and existed for more than three or four days the thrombus does not become detached to form an embolus, but embolism may occur if a new thrombus forms in a proximal vein or in a vein elsewhere in the body.

S. R. TOWNSEND

**Similar Fibroid Tumours Occurring in Identical Twins.** Walsh, G. and Pool, R. M.: *South. M. J.*, 1940, 33: 1098.

Negro twins of the same weight, height, colour, with marked similarity in features, mannerisms, and voice inflections both showed uterine fibroids. One was operated upon about two weeks before the other. The mass removed at operation in both cases consisted of about a dozen hard encapsulated white tumour-masses which on examination proved to be leiomyomata with a considerable amount of connective tissue. The twins were 24, and one stated that she had had the swelling in her abdomen for about two years, while the second twin said that she had noted hers about a month previously. The authors, however, felt that in view of the size of the swelling, she had probably noted it for a much longer time than that. The first twin had a cystic ovary and normal appendix; the second twin had an inflamed appendix which was removed.

MADGE THURLOW MACKLIN

### Oto-rhino-laryngology

**Paranasal Approach to Intracellar Tumours.** Nager, F. R.: *J. Laryn. & Otol.*, 1940, 55: 361.

This paper discusses the question of extra-cranial and intracranial approach to pituitary tumours. The transnasal methods of Kocher, Halstead, Hirsch and Cushing are all open to the objection of the length and narrowness of the funnel of tissue in which the operative work has to be carried out. The transpalatine operation of Preysing has a wider approach but has a greater possibility of infection from the mouth although the author states that in his experience with this operation he has never seen a case. The transthemoidal and transphenoidal operation of Chiari eliminates most of these objections to an extra-cranial approach. It has been used by the author 43 times with success. The operation is done under local anaesthesia and the point of entrance is the nasal aspect of the orbit. The contents of the orbit are retracted laterally and a wide short approach to the sella is provided. The scar is almost invisible. In 39 transphenoidal exposures on 34 patients with pituitary tumours

there was no direct post-operative mortality except in one patient who died eight days after operation from pneumonia with heart failure. The indications for the operation are big intrasellar tumours with visual involvement. The visual signs present are, the presence of central scotomata and homonymous hemianopsia. The contraindications for the Chiari operation or the indications for using the intra-cranial transfrontal approach are pure suprasellar tumours without dilatation of the sella, tumours with a suprasellar extension and internal hydrocephalus.

The advantages of the transphenoidal approach are that it can be used in old people, those in poor condition, gives the best prospects of visual restoration, and provides a wide and convenient exposure. The dangers of meningitis from an extra-cranial approach have been greatly overestimated, and with this operation there is no danger of blood clot formation such as there is with the transfrontal approaches. Lastly reoperation if required can be readily carried out by the same route. GUY H. FISK

### Therapeutics

**War Burns and their Treatment.** Wakeley, C. P. G.: *Practitioner*, 1941, 146: 27.

First-aid treatment includes the prompt administration of a hypodermic injection of morphine. One-third of a grain should be given and repeated in half an hour, if there is still pain. As a first-aid dressing medicated jellies are used. Amertan jelly, made of 1 per cent gentian violet with merthiolate 1:5,000; tannafax, or tannax all have their advocates, but the preference of the author is the gentian violet preparation. Burns of the face are treated with cod liver oil. If the eyes are burnt drops of easter oil containing 1 per cent cocaine should be instilled.

Hospital treatment starts by treating primary and secondary shock. Fluids by mouth and intravenous plasma should be given. The best substitute for plasma is a 6 per cent gum saline solution. Local treatment consists of three recognized methods: (1) triple dye method; (2) tannic acid method; (3) the envelope method. In cases in which both arms or legs have been burnt to practically the same degree and extent, one extremity was treated with triple dye and the other with tannic acid. Triple dye gives far and away the better results and the patients complain of less pain. The envelope method is simple, requires no special apparatus, and can be applied without a general anaesthetic on receiving the casualty anywhere.

**Mustard gas burns.**—Complete decontamination of the patient including the burnt area is achieved by removal of the clothing and washing the whole body thoroughly with bleaching powder solution (60 grains to 1 pint). Blisters

are incised. Dry the burnt area and treat with gentian violet ointment.

**Liquid lewisite burns.**—Complete decontamination as with mustard gas, and a hot bath. The burns may be treated with triple dye.

**Phosphorus burns.**—As a first-aid treatment a solution of 2 per cent copper sulphate should be applied to render the phosphorus inert. Oily dressings are not used.

**Electrical burns.**—Should the burnt area be extensive the best form of treatment is complete excision followed by skin grafting. The small electric burn requires nothing more than the application of some triple dye, *i.e.*, an aqueous solution of triple aniline dye (gentian violet 1:400, brilliant green 1:400, flavine 1:1,000).

C. R. BOURNE

**Subacute Bacterial Endocarditis Treated with Sulfapyridine and Heparin.** Fletcher, C. M.: *The Lancet*, 1940, 2: 512.

The author suggests that the encouraging results reported by Kelson and White in the treatment of subacute bacterial endocarditis with sulfapyridine and heparinization of the blood may lead to its further trial. The object of heparinization is to restrict further thrombotic deposition on the cardiac valves and to diminish the nidus and culture medium for bacterial growth, to prevent embolism from the freeing of fresh thrombus, and to check the growth of vegetations so that proliferating fibroblasts may fill in the area thus limited. At the same time and for a week before and after the fourteen days of heparinization, sulfapyridine is given for its bacteriostatic action. The author describes a case of subacute bacterial endocarditis in which treatment with sulfapyridine and heparin was attempted, but the patient died from cerebral hæmorrhage. To render the blood less coagulable in a disease in which emboli are common is to run the risk of serious hæmorrhage. In many cases sulfapyridine temporarily sterilizes the blood stream and abolishes embolic accidents, hence the week of treatment with the drug before using heparin diminishes the possibility of serious hæmorrhage. In this reported case this safeguard failed. Three other cases have also been reported in which hæmorrhage occurred. Heparin treatment should only be undertaken when tests show that the infecting strain of *S. viridans* is amenable to chemotherapy.

S. R. TOWNSEND

**The Use of Heparin in the Prevention and Treatment of Post-operative Thrombosis and Embolism: A Preliminary Report.** Priestley, J. T. *et al.*: *Proc. Staff Meet., Mayo Clinic*, 1941, 16: 60.

The authors' results with the use of heparin in the treatment of patients who have had pulmonary embolism have been most gratifying. There were no cases in which further evidence

of embolism had occurred during the administration of heparin except in two.

In addition to preventing death from subsequent embolism following an initial embolic episode, the administration of heparin is accompanied often by a prompter amelioration of clinical symptoms of embolism than might be expected otherwise.

S. R. TOWNSEND

## Radiology and Physiotherapy

**Wartime Military Roentgenology.** De Lorimier, A. A.: *Radiology*, 1941, 36: 391.

The author has covered in detail the plan of x-ray work in wartime in the United States army along with a discussion of the new mobile x-ray unit which has a generator with a rated capacity of 2,500 watts. The weight of this gasoline electrical generator is under 200 pounds, and it provides for operation of the x-ray tube at 30 ma. with a kilovoltage of 85. This tube may also be used for x-ray treatment, as in gas gangrene. This article should be read in its entirety as it gives a great many details which would prove of value to radiologists in any theatre of war.

R. C. BURR

**Significance of Function in Tendon Repair.**

Mason, M. L.: *Arch. Phys. Therapy*, 1941, 22: 28.

The author reports a series of experiments on tendon-healing in dogs, and records his observations which he believes from clinical experience are applicable to human cases. His observations are as follows.

Tendon healing goes through three phases, during which its tensile strength shows marked variations. First there is a phase of rapid diminution of strength lasting about four days. Secondly, there is a phase of rapid increase of strength up to the sixteenth day from the time of suture. Thirdly, there is a phase of slow increase of strength lasting to the thirty-fifth day and possibly longer. During the first and second phases movements and exercises have no effect on the tensile strength, but in the third phase there is marked acceleration in the increase of tensile strength by movement. Function during the first and second phases only serves to produce an increased reaction and separation of the tendon ends. Restricted use started on the fourteenth day leads to a very slight increase in reaction, but active unguarded use even after three weeks' immobilization causes a marked reaction and increased stretching of the line of union. The holding power of the tendon for the sutures shows a marked drop below its original power and does not begin to rise until the fifth day after closure. It does not rise consistently above the strength of the original suture until the fourteenth day. Therefore although the strength of union for the first nine days is entirely due to suture it is not so



great as the immediate sutured strength until after fourteen days.

The author concludes that tendon suture cases should have restricted function beginning at two weeks after suture and increasing till at six weeks from suture normal use is allowed.

GUY H. FISK

## Anæsthesia

**Inhalation Anæsthesia in Obstetrics.** Moffitt, J. A.: *Current Res. in Anæst. & Anal.*, 1941, 20: 106.

Within recent years a demand has arisen for absolute relief during labour regardless of safety. However there is now a tendency to rely upon the physician to select a type of anæsthesia best suited to the individual patient's requirements. The ideal inhalation anæsthetic for obstetrics has not yet been found. Such an agent should be rapid and controllable; any degree of anæsthesia and relaxation readily obtainable; and above all it should be safe for mother and child, with no immediate deleterious effects such as anoxæmia, cardiac and respiratory depression, or remote complications such as brain injury, renal or hepatic damage. It should relieve restlessness as well as pain and not retard labour. Obstetrical anæsthesia requires an agent that ensures an adequate supply of oxygen to both mother and child, and thus it is difficult to sufficiently anæsthetize the mother without overdosing the baby. Obstetrical patients quite frequently present the further complication of food in the stomach with its attendant hazards and difficulties.

*Vinyl ether* has been recently introduced and may be used by the open technique but preferably by the closed method with oxygen, as it is extremely volatile. It is a very potent agent but the recovery time is relatively short. Its technique of administration is more difficult because of the variation in the usual signs of anæsthesia. *Nitrous oxide* is ideal for obstetrics but should never be given with less than 15 per cent of oxygen. Anæmic patients and those having received heavy premedication require even more. Induction and recovery are extremely rapid. *Ethylene* permits the use of more oxygen than nitrous oxide, but because of its explosibility it should never be administered intermittently but should be reserved for continuous anæsthesia. *Cyclopropane* has the greatest potency of any of the gases now in use. It produces uterine relaxation comparable to that of ether and is useful in all types of operative obstetrics. Like ethylene it is explosive and should be used by the closed technique and not employed for intermittent analgesia. The large excess of oxygen with which it may be administered makes it a very desirable agent for obstetrical anæsthesia. F. ARTHUR H. WILKINSON

## Obituaries

Dr. Percy C. Banghart, of London, Ont., died suddenly on April 6, 1941.

Dr. Banghart was born in Oil City in 1882. After receiving his early schooling in that district he attended Western University Medical School and graduated in 1905. After two years as an intern at Victoria Hospital he established a practice in Dorchester where he remained for 14 years. He sold his practice and for a time did special work in Harper Hospital, Detroit. Returning to London he set up practice there. In 1927 he went to Europe and took up special work in Edinburgh and Vienna.

Dr. Thomas Walter Blanshard, of Burlington, Ont., formerly an x-ray specialist in Hamilton, died on March 12, 1941, in his fifty-eighth year. He was a graduate of the University of Toronto (1905).

Dr. Charles Cyrus Grant, formerly of Sylvan Lake, Alta., died in Toronto on April 5, 1941, aged eighty-five. He was a graduate of Trinity University, Toronto, in 1901.

Captain William Hazen Embree, M.D., C.M., died in the Battle of the Atlantic, early in May, 1941. He was the son of Mr. and Mrs. J. R. Embree, Amherst, N.S., and a Dalhousie graduate of 1938.

James Franklin Irving, of Yorkton, Sask., died on April 18, 1941, after injuries received in a motor accident a week before. He was born in Metcalfe, Ont., in 1877 and was educated at the Winchester Public School and the Winnipeg Collegiate. He graduated in medicine from the University of Manitoba in 1900, and began practice in Yorkton in 1900. For many years he was a member of the Medical Council of Canada and at the time of his death was a member of the Council of the Saskatchewan College of Physicians and Surgeons. He was a Fellow of the American College of Surgeons.

In 1914 Dr. Irving helped to organize the Saskatchewan Hospital Unit. He went overseas in May, 1916, as second in command, with the rank of major. The unit became known in France as Number 8 Stationary Hospital at Cammeras. Throughout the remainder of the war he served as chief surgeon of this unit. He was with the Independent Air Force in 1918 and with Number 8 London Standing Medical Boards until March, 1919, when he returned to Yorkton and resumed practice.

Last year he was appointed medical health officer for Yorkton and medical health officer for the Rural Municipality of Orkney. For many years he was medical officer of the Canadian National Railway and also medical officer for the Department of Pensions and National Health.

His untimely death was a deep shock to the people of Yorkton where he was a vital and strong part of the young city.

### AN APPRECIATION

The passing of Dr. Irving has left a void in the ranks of the medical profession of this district which will never be repaired within our generation. His professional skill and ability were great, and had received provincial, dominion and international recognition. But to us in the intimate contacts of our daily work he was a tower of strength on which we all leaned more often than we realized.

His character, his integrity, and his relations with his fellow men were such as anyone in any walk of life might be proud to emulate. To us who were associated with him in professional work—both doctors and nurses—he was in many ways more like a father . . . admired, respected, loved. His native good judgment, equanimity, and saneness of thought made his opinion valued and sought after on all sides.

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As physician, man, and friend, his memory will long be honoured and cherished by all who came in contact with him.  
C. J. HOUSTON

Dr. John Andrew Kane, of Cobalt, Ont., died on March 8, 1941. He was born in 1877 and a graduate of Edinburgh (1906).

Dr. George Colvin Ketchum, aged 52, of Nokomis, Sask., died suddenly on March 25, 1940, while attending a maternity case in the country. He homesteaded in the Saskatoon district twenty-five years ago and was a veteran of the first world war.

In 1935 he took his B.Sc. from the University of Saskatchewan and in 1938 his M.D. from the University of Alberta. He was an intern at the Regina Grey Nuns' Hospital in 1939-40.

Capt. James Wendell Kippen, R.C.A.M.C., aged 25, was reported missing on May 6th following the sinking of a British ship due to enemy action. A son of Dr. and Mrs. Robert D. Kippen, he was born in Newdale, received his early education there, and his medical education in the University of Manitoba at Winnipeg, graduating in 1939. During his final year he was President of the Manitoba Medical Students Association and senior stick. Following graduation he served one year as senior intern in the Winnipeg General Hospital and then enlisted in the Royal Canadian Army Medical Corps. He was proceeding overseas as Medical Officer in an artillery unit when the disaster occurred. Possessed of great vigour and endowed with a vital personality, he was a young man of great promise and already had a wide circle of friends.

Captain Robert William Maclellan, R.C.A.M.C., died at Cogswell Street military hospital, Halifax, N.S., on May 6, 1941. Death followed a brief illness from pneumonia. He was 26 years of age.

Captain Maclellan was the son of Dr. E. K. Maclellan, formerly professor of obstetrics at Dalhousie, and Mrs. Maclellan. One of the youngest students ever to graduate from Halifax Academy, winner of the Governor-General's medal, he had a high scholastic record. In 1933 he took his Arts degree from Dalhousie, and in 1938 graduated in medicine. He had served in the army for more than a year at the time of his death.

Dr. Andrew Ruppert, of Toronto, died on or about April 3, 1941. He was born in 1865 and a graduate of Trinity University, Toronto (1896).

Dr. George Samuel Sadler, Combermere, Ont., died on January 10, 1941. He was a graduate of Queen's University (1899).

Joseph Patrick Savage, of Brantford, Ont., died on April 6, 1941. He was born in 1884.

Joseph Patrick Savage did not hold a degree in medicine. He completed successfully examinations set by a board of examiners appointed by the Attorney-General's Department, and was allowed to register with the College of Physicians and Surgeons of Ontario in 1925 by a special act of Parliament.

Dr. Wilfrid Lorne Tyrer, of Moosonee, Ont., died on December 2, 1940. He was born in 1888 and a graduate of the University of Toronto (1914).

Dr. Henry Charles Wales, of Toronto, died on April 26, 1941. He was born in Markham, the son of George Henry Wales, in 1876, and a graduate of the University of Toronto (1899), L.R.C.P.(Lond.), M.R.C.S.(Eng.), 1902; F.A.C.S. He was a past-president of the Academy of Medicine, Toronto.

During the last war Dr. Wales enlisted in the C.A.M.C. with the rank of captain and was attached to the base hospital in Toronto.

Dr. Charles Edgar Willson, of Oshawa, Ont., died on April 20, 1941. He was born in 1890, the son of the late John E. Willson, and a graduate of the University of Toronto (1915). He joined the Royal Army Medical Corps, leaving for active service following graduation. On reaching England, he was gazetted a lieutenant in the R.A.M.C. and was later promoted to the rank of captain. He served in France as Battalion Medical Officer with Imperial regiments, including a battalion of the Northumberland Fusiliers, and was decorated for valour in the field with the Military Cross. Upon his return to Canada in 1919 he took post-graduate work in Grace Hospital in Toronto, and also at Muskoka Hospital, Gravenhurst.

## News Items

### Alberta

The ruling of the Workmen's Compensation Board is that when injured a workman must report his accident to an officer of the industry the day the accident occurs. This is causing considerable disappointment among the members of the medical profession in cases where the workman rushes to the physician without having notified any one other than a comrade workman. If the case is not accepted by the Board, which has occurred many times under a recent ruling, it is with difficulty that the physician gets paid for his services. These are all minor cases, for when a workman feels his injury warrants him collecting compensation he is more inclined to make the formal report, and the Board is less inclined, if the report is not made on the day the accident occurred, to refuse the case. A special meeting is called for a committee of the Council of the College of Physicians and Surgeons and a full Board of the Workmen's Compensation Board which is now composed of three members.

The members of the profession in Alberta are being considerably annoyed by drug addicts applying for narcotics. It is recognized as no treatment at all to give ambulatory cases injections in the doctor's office. Whatever virtue there is in treatment should be given when the patient is under control. Some years ago special provision was made in Alberta whereby drug addicts could be sent to the provincial mental hospital in Ponoka, but this has been changed, and as there is now no proper institution the responsibility of this type of case, according to federal authorities, rests with the province and steps are now being taken with a view to getting the provincial Government to make provision for custodian care of addicts during treatment.

Word has been received from the provincial government that the pathological laboratory that was hoped for for southern Alberta will not be established this year, as no provision was made for the same in the estimates.

The Council of the College of Physicians and Surgeons of Alberta discussed the question of the resolution of the College of Physicians and Surgeons of Manitoba, urging that the Medical Council of Canada be the sole licensing body, feeling that this move would only bring a benefit to future registrants and would take considerable adjustment if it ever were accomplished. The matter was left in abeyance.

Owing to the resignation of Dr. A. Cherry, Representative on the Council for District No. 2, Lethbridge, a new election is being arranged which will take place on June 15th next.

The provincial refresher course was held at the University of Alberta, Edmonton, commencing Monday.



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May 12th for five days. It was expected that the registration this year would be as large as last year owing to the increasing popularity of the course, though somewhat handicapped by the militia enlistment of members of the profession.

The sympathy of the members of the profession and a large number of people in Calgary go out to Dr. George A. Anderson whose wife recently passed away. The body will be interred in the family plot in Newmarket, Ontario.

Dr. F. F. Law, of Tosfield, is moving to Edmonton, to be associated with Dr. E. S. Allin.

Dr. P. W. Jaron, of Foremost, has moved to Calgary, and is now associated with Dr. S. H. McLeod.

The Hon. W. W. Cross, M.D., Minister of Health, announces the establishment in the near future of three additional health units, though the names of the places are not announced. Provision was made at a recent session of the legislature whereby the school boards for the enlarged areas could establish and operate health units whose boundaries could be co-terminous with that of the board.

The town of Magrath, situated in the centre of the Southern Alberta irrigation belt, is now meeting a long felt want by establishing a community hospital. Formerly the patients were taken 22 miles to a Lethbridge hospital. G. E. LEARMONTH

### British Columbia

The dates of the Annual Meeting of the British Columbia Medical Association have been definitely set for September 16th, 17th, and 18th, and meetings will be held in the Hotel Vancouver, Vancouver. Up-to-date speakers have been arranged for. Further details will be forthcoming later.

At the Annual Meeting of the Council of the College of Physicians and Surgeons of British Columbia the following were elected to office: *President*—Dr. Wallace Wilson, Vancouver; *Vice-President*—Dr. W. A. Clarke, New Westminster; *Treasurer*—Dr. F. M. Bryant, Victoria; and Drs. H. H. Milburn, Vancouver, and Thomas McPherson, Victoria, were appointed representatives from British Columbia on the Medical Council of Canada.

The Annual Summer School of the Vancouver Medical Association will be held on June 17th, 18th, 19th, and 20th. The following list of speakers indicates an excellent program: Dr. Perrin H. Long, Baltimore; Dr. R. R. Struthers, Montreal; Dr. E. E. Osgood, Portland; Dr. C. Frederic Fluhmann, San Francisco, and Dr. R. M. Jones, Toronto. The fee has been reduced from \$7.50 to \$5.00 and it is hoped that the increased attendance thus made possible will offset the reduction. The meeting is so timed as to be through in plenty of time to allow all who wish to go to Winnipeg to the Annual Meeting of the Canadian Medical Association to get there without undue hurry.

Vancouver had the pleasure of a visit recently from Colonel Lavell H. Leeson, A.D.M.S., 3rd Canadian Division.

Dr. Murray Meekison, orthopaedic specialist in Vancouver, has left recently for England where he will assume duties as Squadron Leader in the Royal Air Force, being attached to one of the large orthopaedic hospitals in connection with this force.

The question of hospital interns is beginning to become a difficult one for hospitals in this Province since so many of the young medical men are joining

the military forces of the Crown. On one or two occasions this has led to somewhat misinformed criticism by public bodies. Recently, for instance, the Metropolitan Health Committee of Greater Vancouver protested bitterly against the enlistment in the R.C.A.M.C. of two of its specially trained medical personnel on the grounds that better use could be made of them in civilian life and some somewhat acrimonious correspondence passed between this body and the military authorities. The Divisional Advisory Committee on military and medical matters in British Columbia, which has been working jointly with the National Advisory Committee of the Canadian Medical Association, took this up, and Dr. E. Murray Blair, Chairman of the Committee, made a statement to the press showing that the Canadian Medical Association had foreseen these problems and had taken the steps to deal with them since the beginning of the war. This statement further showed that these men were being employed at their own special type of work in the R.C.A.M.C. and were doing a very valuable service thereby. This statement seems to have cleared the air, but it is to be regretted that public bodies had not informed themselves of the facts before making inaccurate statements. J. H. MACDERMOT

### Manitoba

Dr. Frederiek F. Tisdall, Toronto, addressed a large public gathering in the Winnipeg Auditorium on the night of April 14th under the auspices of the Women's Canadian Club. His address on "Nutrition" was particularly apt at this time and the speaker received undivided attention from the audience. Mrs. J. S. DeLury, President of Canadian Club, presided and Dr. Gordon Fahrni, the President-elect of the Canadian Medical Association, introduced the speaker. The Hon. James McLennaghan, Minister of Health and Public Welfare, moved the vote of thanks.

In co-operation with the Sanatorium Board of Manitoba Dr. M. S. Lougheed, Medical Health Officer of Winnipeg, is planning an intensive drive against tuberculosis during 1941, and as the initial step the tuberculin testing of 1,839 school children has been completed. That the public are becoming well informed on the need for anti-tuberculosis effort, and are eager to do their part, is indicated in the fact that 95 per cent of the parents (from whom permission was sought before doing the tests) willingly gave their consent.

One of the awards in the 1940 Canadian Rural Health Conservation Test went to the St. Vital-St. James Health Unit, which maintained a high standard that secured for it first place in the 1939 contest. Dr. I. M. Cleghorn, now with the R.C.A.F., in charge of the health services for western Canada, was the medical director of the unit when it won the first award in the 1939 contest, and medical director for 1940.

Grace Hospital, Winnipeg, is planning to erect a nurses' residence at the corner of Preston and Evanson Streets. The plans call for the basement and two storeys to be completed, but the foundation will allow two additional storeys to be added when necessary.

Dr. T. C. Routley spent a busy three days, April 15th to 17th, in Winnipeg, meeting members of the various Winnipeg local committees in connection with the coming Annual Meeting of the Canadian Medical Association.

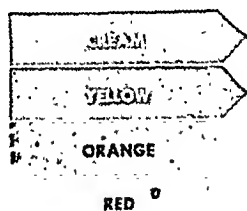
Miss Evelyn Mallory, R.N., Superintendent of Nurses, Children's Hospital, Winnipeg, has resigned her duties, and on June 1st will become registrar and inspector of training schools for nursing in British Columbia. Miss Mallory is a graduate of the Winnipeg General Hospital training school and has headed the

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nursing school of Children's Hospital since August, 1935. She has taken an active interest in nursing education and for the last two years has been president of the Manitoba Association of Registered Nurses.  
ROSS MITCHELL

### New Brunswick

Dr. P. M. Knox, Superintendent of the Jordon Memorial Sanatorium at River Glade is seriously ill and is confined to the Moncton City Hospital. During Dr. Knox's illness, Dr. A. M. Clarke, of Saint John, is acting Superintendent at River Glade.

It was announced in the *Royal Gazette* recently that Dr. E. W. Lunney, of Saint John, N.B., has been appointed a member of the Board of School Trustees for the City of Saint John.

It was recently stated by the Canadian press that the city of Saint John had been given first place in the category of cities with a population under 100,000 on the National Health Honour Roll. This means that each unmed city in each group has provided the most effective health protection services for its people in its population group. Credit for this is due to the endeavours of Dr. A. M. Clarke, Medical Officer, Health Centre, Saint John.

Dr. S. R. D. Hewitt, Superintendent of the Saint John General Hospital is still on sick leave, slowly convalescing from serious illness.

Dr. H. A. Farris and Dr. Norman Skinner have recently returned from a visit to Boston, where they attended the meeting of the American College of Physicians.

Dr. W. W. White, of Saint John, was re-elected President of the New Brunswick Division of the Saint John Ambulance Association.  
A. S. KIRKLAND

### Nova Scotia

The Halifax Medical Society at its annual meeting discussed hospital facilities in Halifax and found them wanting. Speakers were many, and graphic as they pictured the distress and inconveniences of bed shortages. Discussion culminated in a resolution: That the present inadequate hospital accommodation be brought to the attention of the civic and provincial governments.

Dr. Thomas A. Lebbetter, of Yarmouth, was invested as a Fellow of the American College of Physicians at the annual convocation exercises of the college at Boston.

Dr. Eric W. MacDonald has been appointed to the newly created position of surgical director to St. Joseph's Hospital, Glace Bay.

A hospital for Shelburne is to become a reality, following the purchase of land and the preparation of plans by Dr. J. R. Corbett, of Clark's Harbour. The first hospital in the county, the new institution will be beautifully situated on the banks of Shelburne harbour.

Dr. Judson V. Graham is the newly elected president of the Halifax Medical Society. The vice-president is Dr. Allison Paysant, Dartmouth; the secretary-treasurer is Dr. Kenneth Grant.

Dr. C. A. Donkin heads the Bridgewater Board of Trade for 1941.

Dr. S. J. Shane goes from the Nova Scotia Sanatorium to take up practice in Port Maitland.

ARTHUR L. MURPHY

### Ontario

Among those who attended the Boston meeting of the American College of Physicians were Drs. Angus McKay, J. H. Holbrook, L. J. Breslin, W. W. Priddle, H. K. Detweiler, and L. J. Solway. Dr. W. S. Lyman, of Ottawa, was elected Governor for the Province of Ontario for a period of three years.

In a recent statement the Honourable Harold Kirby, Minister of Health for the Province of Ontario, revealed the fact that 470 Ontario doctors are on active military service. This number represents one out of every nine registered doctors in the Province.

Dr. E. E. Cleaver, of Toronto, addressed the Section on Gastro-enterology of the Montreal Medico-Chirurgical Society in the Montreal Neurological Institute during the last week of April.

The new wing of the Victoria Hospital, London, Ont., was officially opened on May 26th by Dr. Leonard George Rowntree, a graduate of the University of Western Ontario who served in the Victoria Hospital as an intern previous to becoming a member of the Staff of the Johns Hopkins Hospital, Baltimore.

Dr. Leonard G. Rowntree has been appointed by President Roosevelt Chief of the Medical Division of the Selective Service System.

In the Medical Advisory Council, which has been formed to co-operate with national headquarters on problems connected with the examination of registrars, there appears the name of Dr. Thomas S. Cullen, Professor Emeritus of Gynecology at Johns Hopkins University, a Trustee of the American Medical Association, and a graduate of the University of Toronto.

A celebration of the semi-centennial of the founding of carbohydrate chemistry by the discoveries of the late Emil Fischer, German Organic Chemist and Nobel Laureate in 1902, was held on April 10th at the St. Louis meeting of the American Chemical Society. Emil Fischer's son, Dr. Hermann O. L. Fischer, Research Professor of Organic Chemistry at the Banting Institute of the University of Toronto, was the Honorary Chairman of a commemorative symposium on that day.

Dr. Charles H. Best, Professor and Head of the Department of Physiology at the University of Toronto, has been appointed by the Board of Governors of the University to succeed the late Sir Frederick Banting as Director of the Banting-Best Department of Medical Research. To fill this post, he resigns as Associate Director of the Connaught Laboratories, in which position he has been in charge of the purification and production of insulin in Connaught Laboratories from the time of its discovery.

Dr. Gordon P. Jackson, Medical Health Officer of the City of Toronto, was given a testimonial dinner at the National Club at the end of April and presented with a silver cigarette case by the Toronto Diphtheria Committee in recognition of the fact that last year the City of Toronto had no cases of diphtheria.

The many friends of R. M. Gorssline, D.S.O., a graduate in medicine of the University of Toronto (1911) and D.P.H., McGill (1921), Director-General of Medical Services (Army), in the Department of National Defence in Ottawa, will be pleased to learn that he has been promoted to the rank of Brigadier.

The following resolution was passed by the Board of Governors of the University of Toronto at a meeting held on March 13th.

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- - In treatment of acute asthmatic attacks and in cases of chronic bronchial asthma, the administration of aqueous solutions of epinephrine hydrochloride is recognized as quite effective but as sometimes having the disadvantage that the action of individual injections or inhalations is of short duration. As originally reported by Keeney in 1938-39, however, it is clear that this disadvantage can now be overcome by using a suspension of epinephrine in oil.

- - Epinephrine in Oil (1:500) is supplied as a sterile mixture of purified epinephrine and vegetable oil. This mixture, when brought into uniform suspension, contains 2 mg. of epinephrine per cc. When injected in this form, epinephrine is absorbed slowly with the result that its action is correspondingly slow in onset and prolonged in duration.

- - In use of epinephrine suspended in oil it is possible to give a relatively large dose showing beneficial effects equivalent to those of repeated smaller doses of aqueous preparations of this active principle. It is obvious, therefore, that when extended action of epinephrine is desired the relatively prolonged relief which follows injection of Epinephrine in Oil is distinctly advantageous.

*Epinephrine in Oil (1:500) is available from the Connaught Laboratories in 20-cc. rubber-stoppered vials. Prices and information relating to this preparation and to other epinephrine preparations—Epinephrine Hydrochloride Solution (1:1000) and Epinephrine Hydrochloride Inhalant (1:100)—will be supplied gladly upon request.*

**CONNAUGHT LABORATORIES  
UNIVERSITY OF TORONTO**

Toronto 5

-

Canada

It was moved by the Right Honourable Sir William Mulock, K.C.M.G., LL.D., seconded by the Honourable H. J. Cody, LL.D., and unanimously resolved—

"That the University of Toronto shall ever mark the anniversary of the death of Sir Frederick Banting by some action commemorative of his service to humanity in the discovery of insulin."

At the annual meeting of the Association of American Physicians at Atlantic City, Dr. Almon A. Fletcher, of Toronto, was among the eleven new members admitted. The annual dinner address was given by Dr. A. H. Gordon, of Montreal. J. H. ELLIOTT

### Quebec

Le Ministère de la Santé de la province met gratuitement à la disposition des médecins qui en font la demande les médicaments habituels du traitement de la syphilis. On peut se procurer les formules à cet effet en s'adressant au Dr Jules Archambault, directeur de la Division des maladies vénériennes.

Le Dr Léon Gérin-Lajoie n'étant nommé membre du comité avisé du "Banting Research Foundation".

Le Dr Pierre Jobin succède au Dr Paul Garneau à la chaire d'anatomie de la Faculté de médecine de l'Université Laval.

Les changements suivants ont été apportés à la composition de l'exécutif du Bureau Médical de l'hôpital Notre-Dame: secrétaire, Dr Raymond Simard; secrétaire-adjoint, Dr Roger Dufresne. Au Conseil Médical le Dr Léon Gérin-Lajoie est président; le Dr Anselme Léger est vice-président et le Dr Georges Hébert est secrétaire. Les délégués au Bureau d'administration sont les Drs B. G. Bourgeois, D. Marion et A. Bertrand.

Le cours de perfectionnement de l'hôpital Ste-Justine comprendra des leçons sur l'arriération mentale, l'alimentation du nourrisson par les dérivés du lait, les lésions aigues de l'abdomen, l'hypertrophie et l'infection du tissu lymphoïde, les poudres de légumes et de fruits, l'hypertrophie du thymus et la tuberculose pulmonaire. Les cours auront lieu du 2 au 7 juin de 9.30 à midi, et l'inscription est fixée à \$3.

Le Dr. Donat Voghel n'a fait paraître dans l'*Action Universitaire* d'avril un article qui résume bien ce qu'il faut savoir de l'orientation professionnelle.

Le docteur Paul Letondal, F.R.C.P.(C), professeur agrégé à la Faculté de médecine de l'Université de Montréal et chef de service à l'hôpital de la Miséricorde, a été élu directeur de l'*Union Médicale du Canada*. JEAN SAUCIER

### Saskatchewan

Only five out of every thousand Saskatchewan men joining the armed services since the beginning of the present war have been rejected because of tuberculosis, Dr. R. G. Ferguson, medical superintendent of the Saskatchewan Sanatoria, stated. The percentage of rejections for tuberculosis in this war was considerably below that of the last war when twenty men per thousand were rejected.

Dr. A. W. Argue, who has practised in Grenfell forty-four years and has recently been appointed registrar for the Saskatchewan College of Physicians and Surgeons, was honoured by the people in Grenfell at a reception on April 15th. He has been a member of the Council of the College since its inception, in addition to being a member of the Dominion Medical Council. For some years he has been a governor of the University of Saskatchewan. LILLIAN A. CHASE

### General

The Canadian Federation of Medical Women is offering a scholarship loan to medical women undergraduates and recent graduates of intellectual ability and of personality and physique to promise professional success. This loan is open to women in the final two years of any medical school in Canada, or to any recent graduate doing post-graduate work. The loan is repayable within seven years after graduation. Applications are to be sent to Dr. Eleanor Percival, 1374 Sherbrooke Street West, Montreal, before June 10, 1941, with full particulars of scholastic standing and with letters from two members of the medical faculty.

This fund is being raised by medical women across Canada, of whom there are about 428. In British Columbia there are 27 medical women, in Alberta 15, in Saskatchewan 21, in Manitoba 31, in Ontario 258, in Quebec 44, in New Brunswick 6, in Nova Scotia 25, and in Prince Edward Island, 1. The President of the Federation of Medical Women of Canada is Dr. Borthwick-Leslie, of Winnipeg.

The 41st Annual Meeting of the Canadian Tuberculosis Association will be held in the Royal York Hotel, Toronto, in conjunction with the Ontario Laeene Society, on June 6 and 7, 1941.

The first Annual Thomas McCrae Award of One Hundred Dollars was granted to Dr. Robert F. Norris and Dr. Alexander Rush for the best publication in 1940 by younger members of the Medical Staff of the Pennsylvania Hospital, Philadelphia, at a special meeting on Tuesday, April 22nd. Dr. Henry A. Christian, Hersey Professor of the Theory and Practice of Physic, Emeritus, Harvard University, addressed the audience on "Scholarship in medicine".

The Award, honouring Dr. McCrae, late Professor of Medicine at the Jefferson Medical College and late Chief of one of the medical services at the Pennsylvania Hospital, is to be granted annually to younger men of the Medical Staff for the best publication of work done primarily at the Pennsylvania Hospital.

The First Latin-American Congress for Plastic Surgery will be held in Rio de Janeiro and Sao Paulo, Brazil, from July 6 to 12, 1941.

Communications should be addressed to the Secretary, Dr. Linnen Silveira, R. Benjamin Constant, 171, 1º, Sao Paulo, Brazil.

### Book Reviews

*Modern Drugs in General Practice.* E. Browning. 236 pp. \$3.00. Macmillan, Toronto, 1941.

The author in this edition has added two new chapters, those dealing with the sulphonamides and with external applications and local anaesthetics. The book presents in compact form the necessary information about the value, availability, correct application and potential danger of the many new drugs of which every progressive medical man is compelled, by the dictates of medical advancement, to take advantage.

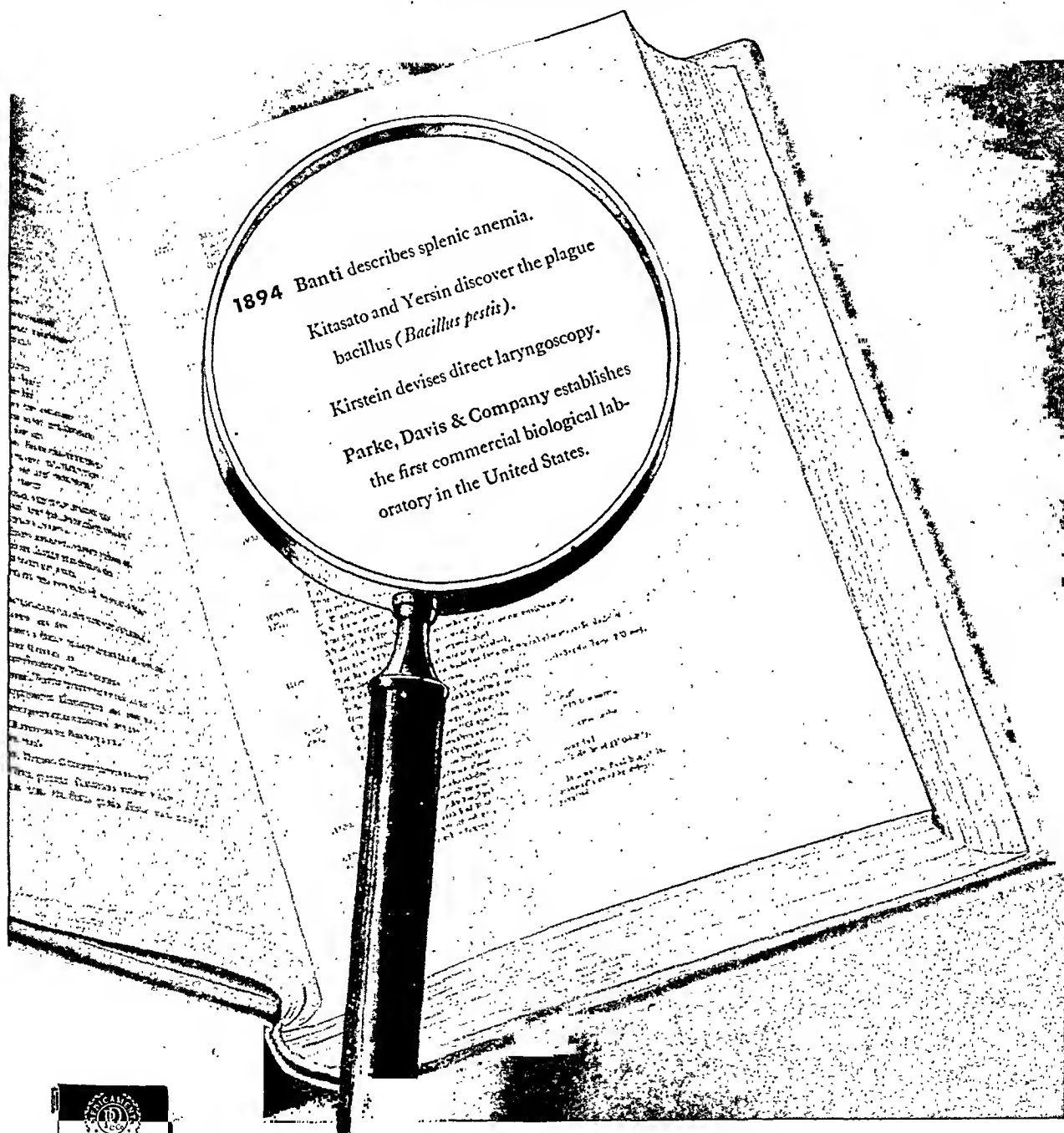
The volume is divided into nine chapters, as follows: Drug Therapy in General Practice; the Sulphonamides; Gold Salts; Cardiac Drugs; Drugs Acting on the Autonomic Nervous System; Sedatives and Hypnotics; Diuretics and Urinary Antiseptics; Gastro-Intestinal Remedies, including Anthelmintics; External Applications, including Antiseptics, Disinfectants and Local Anaesthetics. This work should be well received.

*Anatomy and Physiology Laboratory Guide.* E. J. Farris. 3rd ed., 144 pp., illust. \$2.00. Lippincott, Montreal, 1941.

This is an elementary guide, designed to emphasize only the fundamental principles of anatomy and physiology. So far as it goes it is clear and accurate, and a considerable amount of detail is included.

# These names, these years have helped make modern medical history

One of a series of advertisements commemorating three-quarters of a century of progress and achievement



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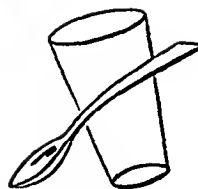


# *How to Control Diarrhea* with *Wyeth's* **KAOMAGMA**

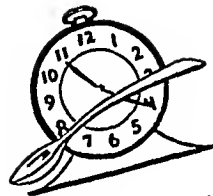
*At the onset...*  
administer two tablespoonfuls of  
Kaomagma Plain, in a little water



*and...*  
follow this with one tablespoonful of  
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*then...*  
when stools become consolidated, one  
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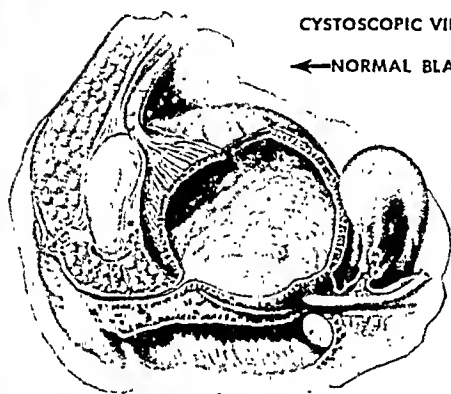
LABORATOIRES MIDY, 67 Avenue de Wagram, PARIS, (France)

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# PYRIDIDIUM

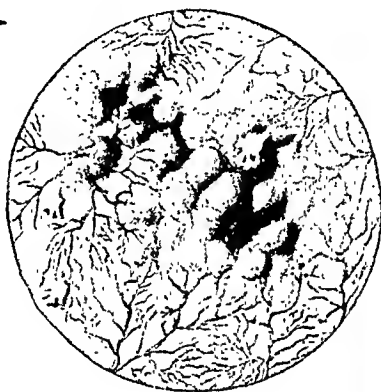
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*For Prompt Symptomatic Relief  
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**14 SLICES OF WHITE BREAD**

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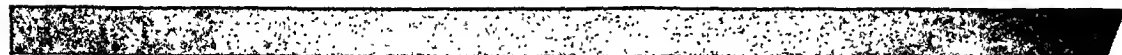
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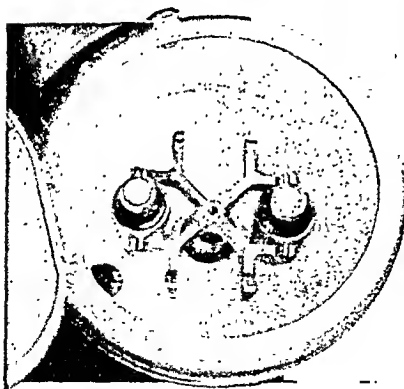
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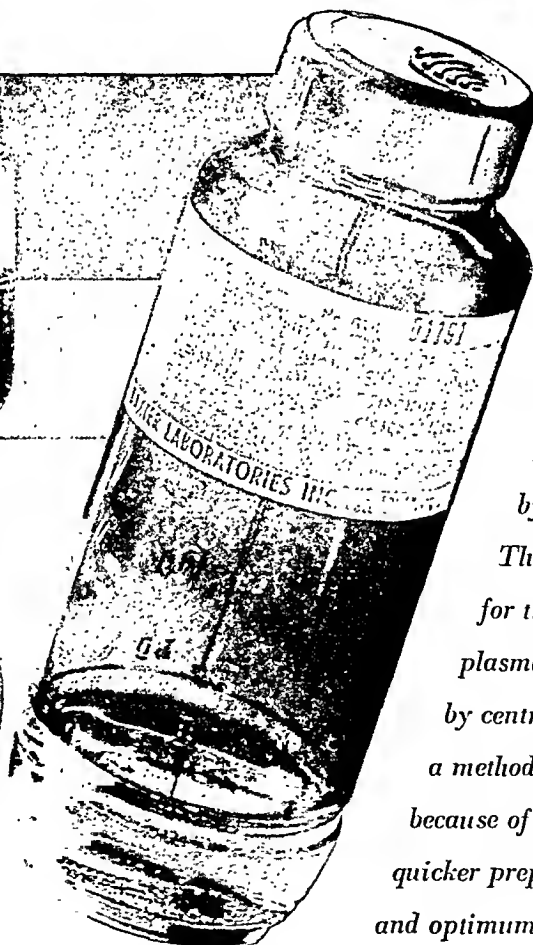
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All  
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ELIXIR  
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TABLETS  
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Contains vitamins B<sub>1</sub>, B<sub>2</sub>(G), B<sub>6</sub>,  
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Vitamin B <sub>2</sub> (G)	500 gammas (200 Bourquin-Sherman units)	600 gammas (240 Bourquin-Sherman units)	250 gammas (100 Bourquin-Sherman units)
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Nicotinic Acid	8 mg.	9 mg.	4 mg.
Filtrate Factor	54 Jukes-Lepkovsky units	120 Jukes-Lepkovsky units	20 Jukes-Lepkovsky units

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\* For severe deficiency larger amounts are prescribed. In acute pellagra, treatment may be supplemented by nicotinic acid.

# DANGER OF DIGESTIVE UPSETS IN EARLY SOLID FOOD FEEDING REDUCED WITH —

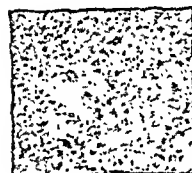
These three photographs show stools of normal infants (diluted 7 times with water and stained with Lugol's solution) 100 times magnified.



Stool of normal infant fed home-strained vegetables. Some of the food is undigested. Many coarse fibres are also seen.



Stool of normal infant fed commercial-strained vegetables. Here, also, some food has not been completely digested. Note coarse fibres that may cause intestinal irritation.



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Recognized by many pediatricians is the desirability of a more balanced diet for the very young infant. Yet the ever present danger of diarrhea and enteritis arising from putrefaction of undigested solid foods in the intestinal tract has kept many doctors from prescribing nutritious solid foods as a supplement to the milk diet.

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Libby's Homogenization process breaks up all coarse fibres—thus, bulk necessary for normal elimination is retained—but turned into a smooth, non-irritating form. Infants as young as six weeks have been fed Libby's Homogenized Baby Foods with no ill effects. And because Homogenization releases nutrient inside the food cells for contact with the baby's digestive enzymes, Libby's Homogenized Baby Foods yield more nutriment than an equal amount of food strained commercially or at home.

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These combinations of Homogenized Vegetables, cereal, soup and fruits make it easy for the Doctor to prescribe a variety of solid foods for infants

- 1 Peas, beets, asparagus.
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And In Addition, Three Single Vegetable Products Specially Homogenized

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**INSTANTLY FOCUSED** for diverging, parallel or converging light rays.

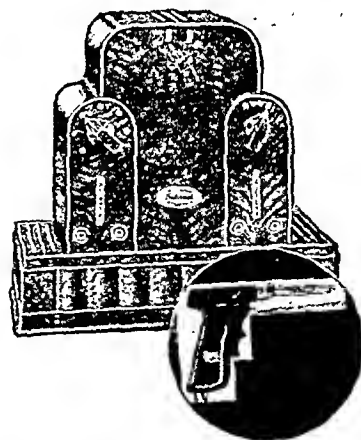
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**SAFE;** No set screws, lock-nuts, or metal projections which may burn operator.

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**MOST EASILY** operated.

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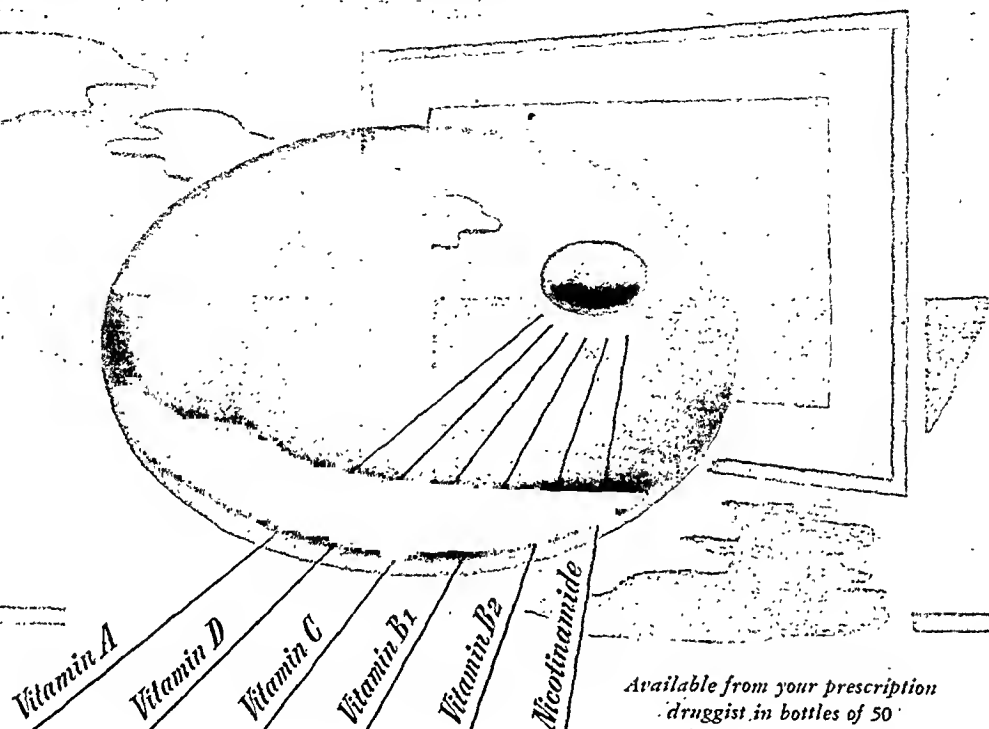
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Vitamin A, . . . 10,000 U.S.P. units  
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Vitamin C, . . . 500 International units  
(25 mg. ascorbic acid)

Vitamin B<sub>1</sub>, . . . 500 International units  
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Nicotinamide, . . . 20 milligrams

\*Trademark Reg. U.S. Pat. Off.

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One drop of urine on a little Galatest powder gives an immediate positive or negative reaction. No test tubes or bunsen burner required.

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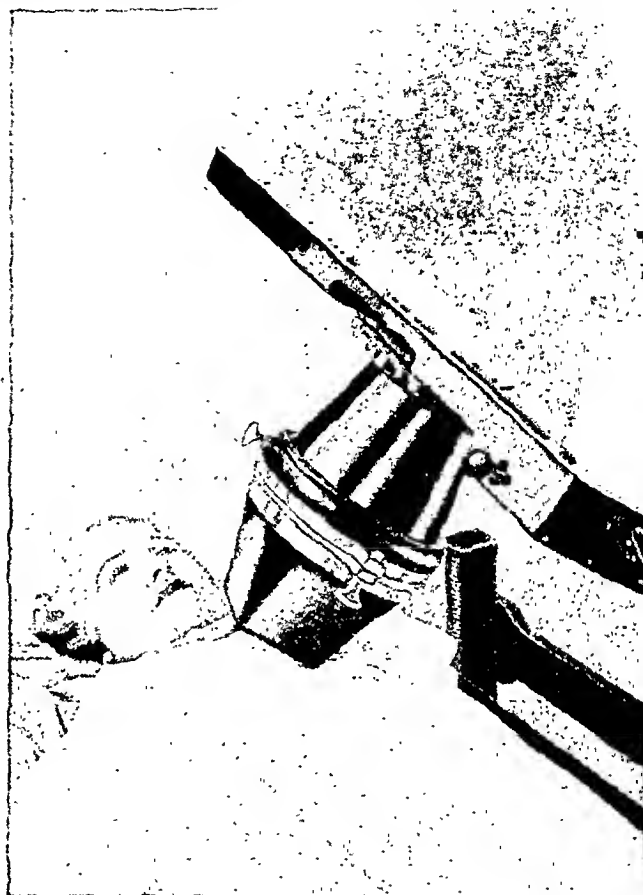
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FROM the planting of Heinz own seeds to the development of special containers, each step in the preparation of Heinz Strained Foods is carefully controlled to insure *uniform excellence*.

All the ingredients used in Heinz Strained Foods are rigidly inspected to make sure that they meet Heinz exacting standards. Then they're scientifically cooked—strained to perfect smoothness—and packed under vacuum in enamel-lined tins. Neither time, effort nor expense are spared to protect rich flavours—tempting natural colours—valuable vitamins and minerals!

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## HEINZ STRAINED CARROTS

Sweet, juicy, tender carrots are the raw material of this product. Its attractive orange colour indicates its richness in Vitamin A. Heinz Strained Carrots are easily digested.



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# HEINZ Strained Foods

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H. J. Heinz Company of Canada, Ltd.

# ADVANCES IN CANNING TECHNOLOGY

## I. Requirements for the Modern Canning Factory

● During the first decade of the 19th Century, Nicholas Appert, an obscure French confectioner, worked out empirically the basic principles of canning. In 1811, the first English edition of his book on the "Art of Preserving" was published (1). This text lays down the fundamentals of the canning process; it describes the necessary organization of a canning establishment and its equipment; and it lists canning procedures for more than 50 foods of both animal and plant origin.

Viewed in the light of modern knowledge, Appert's book is surprisingly complete and many of his observations amazingly accurate. Naturally, in the 130 years since his book was published, many advances have been made in canning technology. Consequently, when Appert's quaintly worded descriptions of the requirements for the use of his process are compared with those of modern commercial practice, some insight may be had as to the vast improvements which have been wrought in this important field of food preservation since its humble beginning.

One striking contrast between the old and new in canning lies in Appert's description of the necessary features of a canning establishment of his day. Appert's establishment apparently was composed of seven rooms or "apartments". Four of these were equipped to handle the preparation of fruits, vegetables, and foods of animal origin; the fifth room was devoted to the cleaning and storage of the glass bottles used as containers; the sixth room was the "sealing" room in which the bottles were corked after filling with food; the last room contained the large covered kettle in which the sealed containers were processed in boiling water.

The requirements for the modern cannery are, of course, much more exacting,

both from the standpoint of factory site, arrangement, and equipment. Today, canneries must be located close to the fields, orchards, or waters from which the raw materials are harvested. Rapid handling of freshly harvested raw stock—a prime requisite for quality of the final product—is thus facilitated. The factory site must also be chosen so that an adequate supply of potable water is available. The modern canning plant is arranged specifically for handling the product or products that will be canned. This provides for continuous, rapid, and even flow through the various operations comprising the canning procedure for the particular product.

Needless to state, the equipment requirements of the modern canning factory are also much more complex than in the days of Appert. Present-day, large-volume production—necessary for the manufacture of a low-cost product—requires the use of high-speed automatic equipment for conveying the raw materials through the cleansing, preparatory, and all other operations of the commercial canning procedure. Frequently, much of this equipment must be constructed of special metals or alloys; in all cases it must be so constructed as to permit rapid, thorough, periodic cleansing. To maintain and control this highly specialized machinery, a skilled mechanical staff is necessary.

Space will not permit fuller description of other requirements for the cannery of today. Thousands of such factories combine to form the canning industry, whose products already have become so essential in our modern civilization and in our national defense. Commercially canned foods have fulfilled every prediction of Appert by whose "extensive practice and long perseverance" a new means of food preservation was made possible.

## AMERICAN CAN COMPANY

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(1). *The Art of Preserving All Kinds of Animal and Vegetable Substances*, N. Appert, Black, Parry, and Kingsbury, London, 1811.



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*Sketch depicting one phase of medical practice in the middle of the nineteenth century. After a woodcut by A. R. Waud.*

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Strychnine Sulphate . 1/67 grain  
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*representing one ounce of fresh brewers' yeast.*

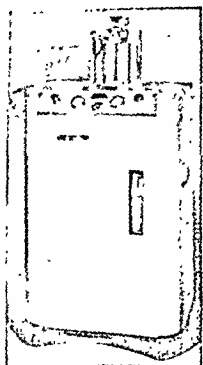
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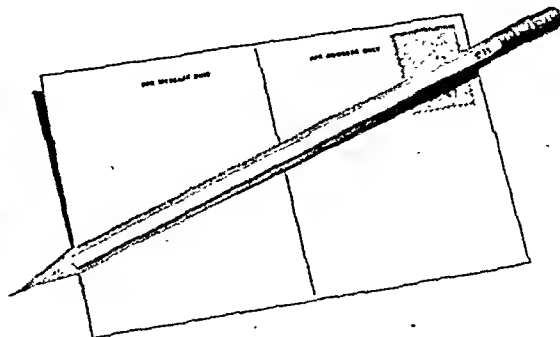
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4. **Many physicians**, at the first sign of harmful effects from caffeine, tell the patient to "Switch to Sanka Coffee". Because Sanka Coffee is 97% caffeine-free, and so cannot produce any of the harmful effects due to caffeine.

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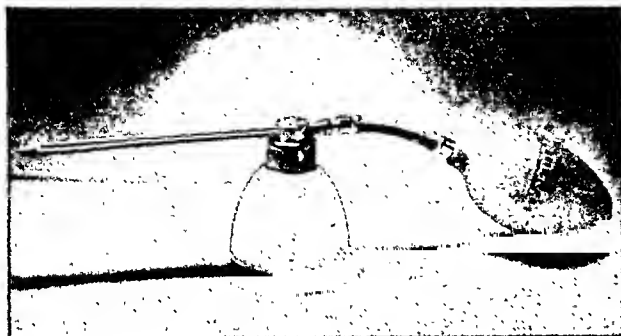
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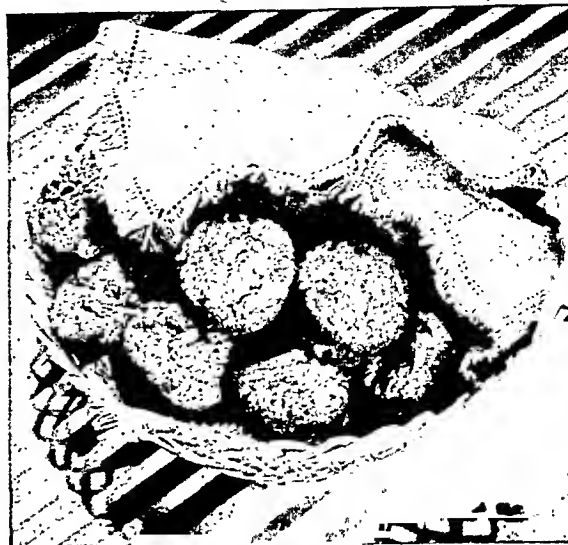
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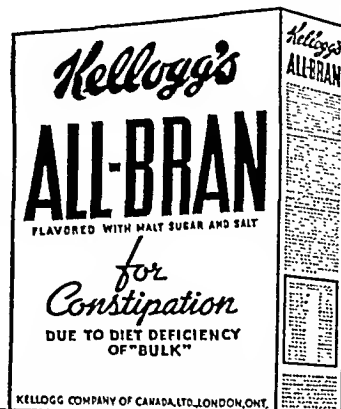


## This May Help in TREATING CONSTIPATION

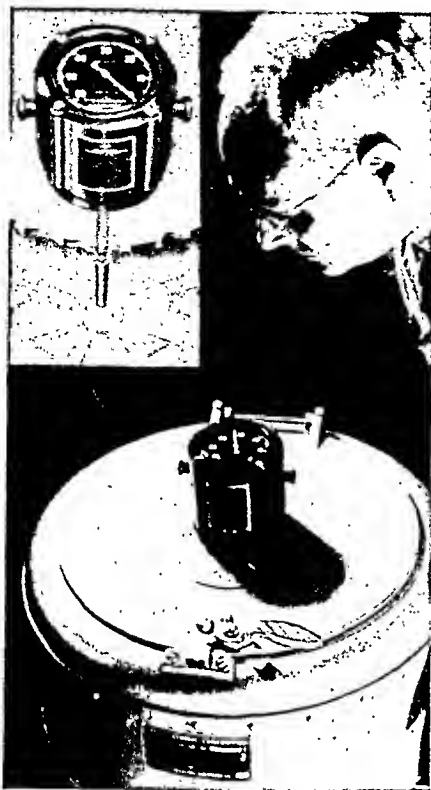
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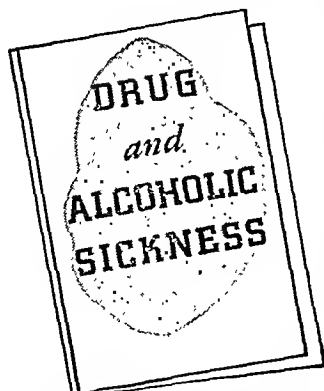
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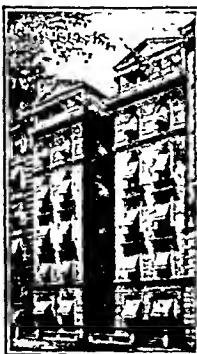
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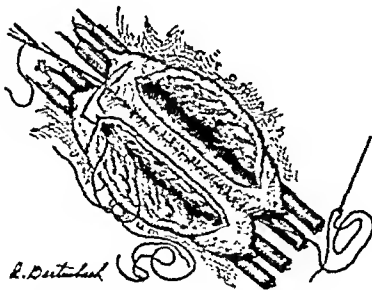
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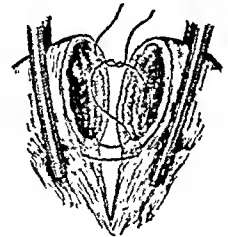
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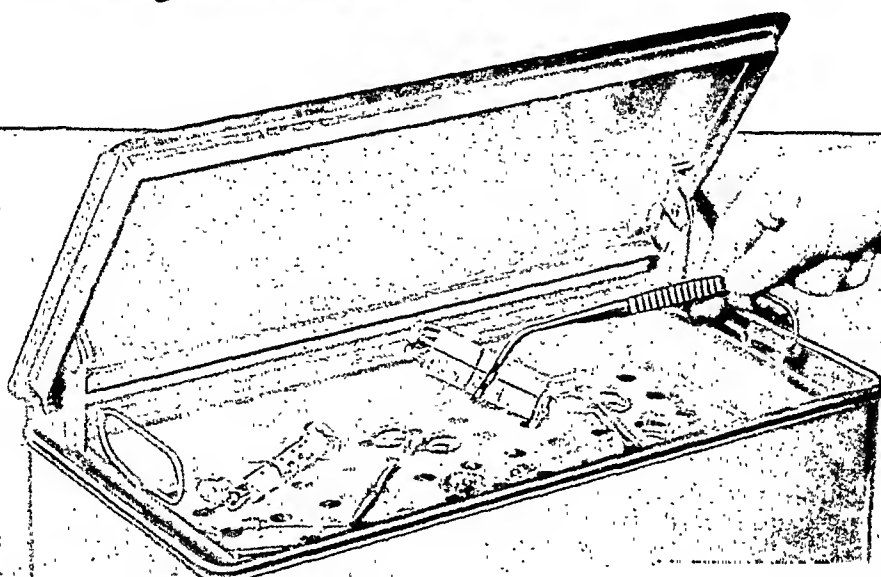
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Vol. 44

MAY, 1941

No. 5

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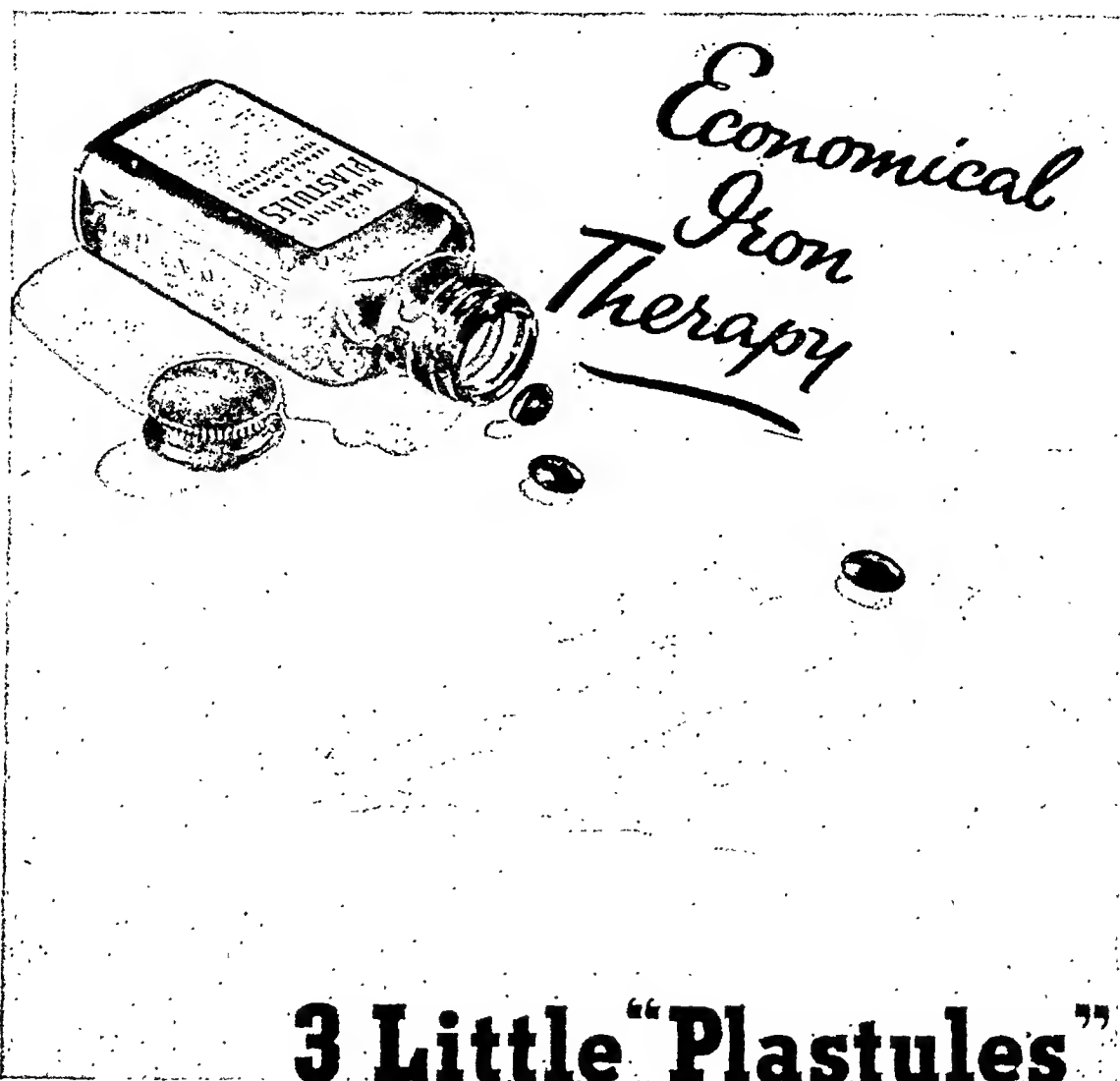
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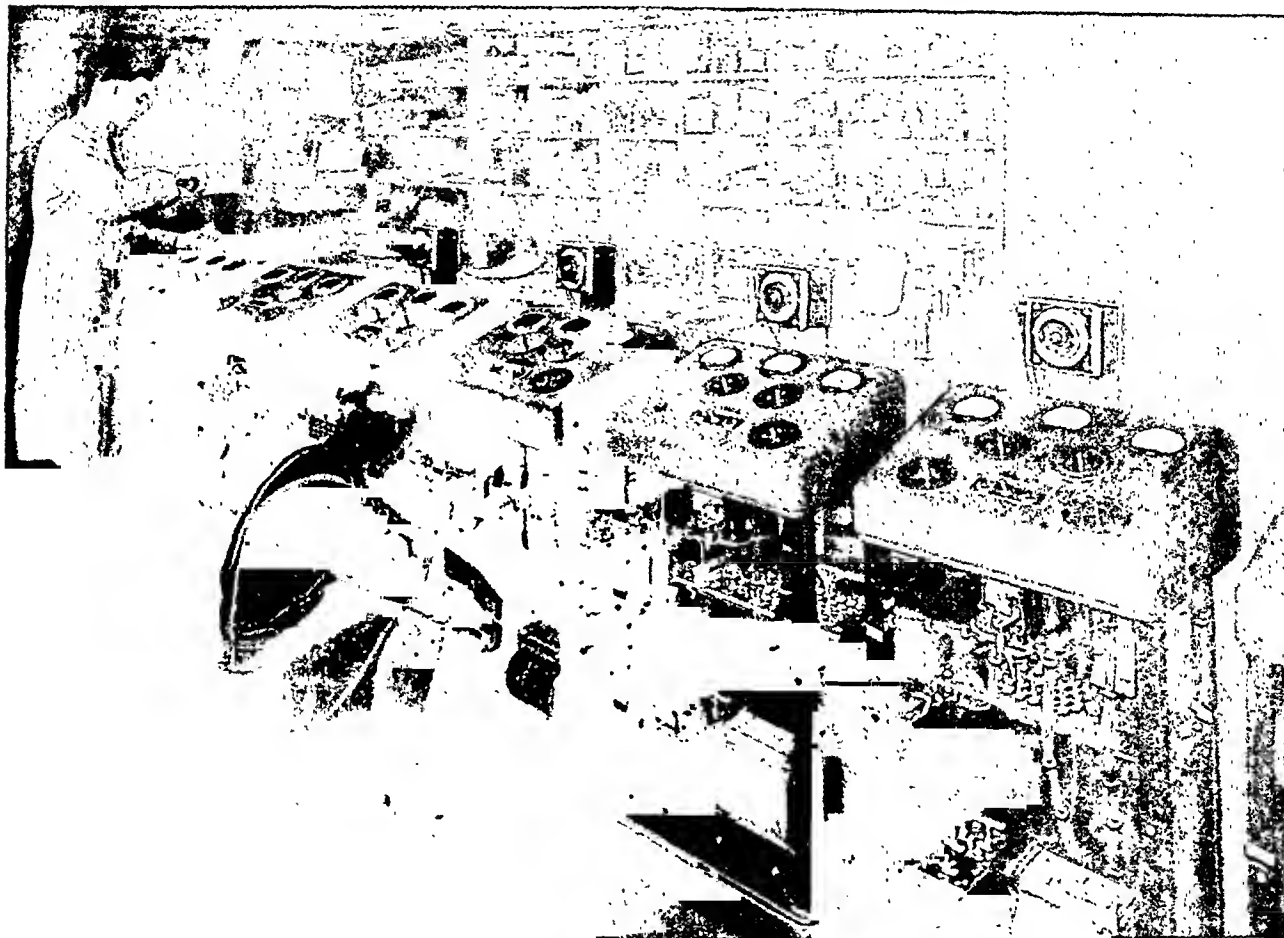
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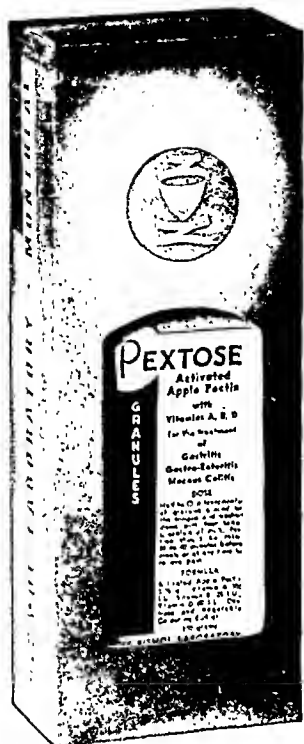
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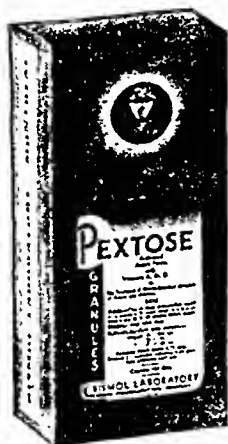


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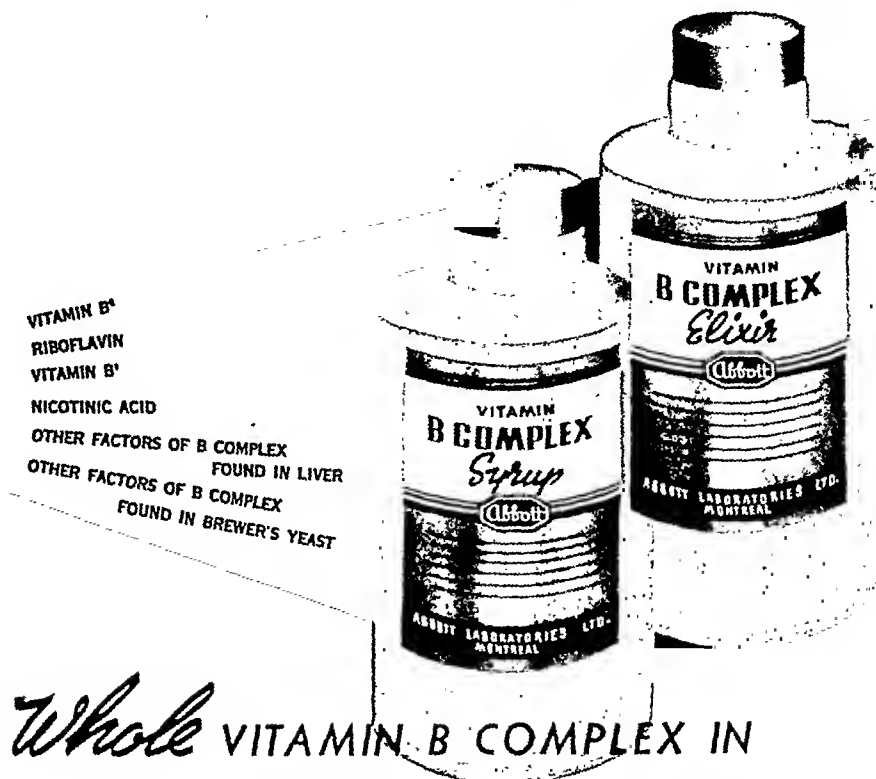
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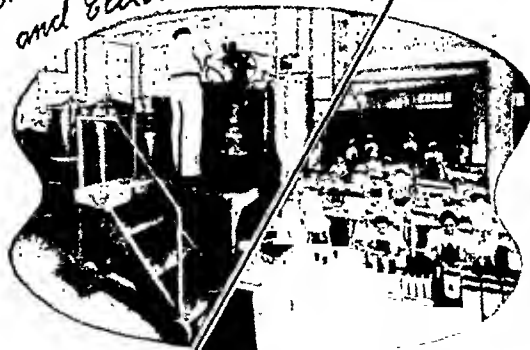
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## WINNIPEG CALLING!

IN this which we call our Convention Number we have endeavoured to concentrate all matter, relevant and irrelevant, pertinent and impertinent, which concerns our Annual Meeting, the only occasion in the year when our Membership has an opportunity to foregather in force. Our readers will be able to glean information about the place of meeting, the program, the entertainment, transportation, accommodation, and much else.

A year or more ago the Executive was in doubt as to the advisability of holding a reunion this year. The cloud of war hung over us and it seemed doubtful whether the sun would break through in time. However, "Business as usual" was adopted as our motto, and it was decided, wisely as we now think, to meet again this year. It was decided, also, again wisely, to convene in Winnipeg. As we write this doubt has given place to hope, and by the time of meeting faith, "the substance of things hoped for", will, we are sure, have been established on a sure foundation. We shall meet, once again, in a hearty, healthy, and friendly atmosphere. But we need your help. Let us all rally to the occasion and GO TO WINNIPEG. The circumstances would seem almost to demand it. We predict a delightful and successful event.

Those of us who had the privilege of being in Winnipeg in 1930, on the occasion of the visit of the British Medical Association to our country, will never forget that gathering. It was hearty, colourful, and inspiring. The hospitality of our hosts knew no limits. To meet our Indian wards and the many races who were to be our new Canadians was a revelation to those of us who hail from "the effete East". It is not, of course, possible that this experience can be repeated, but we can be sure that the hospitality of Winnipeg is not less in this year of grace. It is still as boundless as the prairie, and vastly more agreeable!

We in the East like to feel that we have had some share in the phenomenal growth of the middle and the west of Canada, for did not De La Verendrye, the founder of Winnipeg, hail from Trois Rivières, Quebec. He was the finest type of an adventurer and explorer, and he seems to have left as a legacy something of his dauntless spirit and initiative to his successors in the great city. The future is theirs. We have all heard the rumour that Winnipeg is to be the next capital of the British Empire! When Macaulay's New Zealander sits on a broken arch of London Bridge, gazing on the ruins of St. Paul's, which event, we are all glad to think, is as remote as ever it was, no doubt he will remove to Winnipeg! And, why not?

Next to the foundation of the City the topic of absorbing interest is the Selkirk Settlement and the feud between the Hudson's Bay Company and the Northwest Company. Those who like their history sugar-coated will revel in Frederick Niven's delightful novel, "Mine Inheritance", in which the stirring events of 1812 are portrayed, leading up to the massacre not far from Winnipeg. Court Nez is a great creation. Those who desire a wider horizon will perhaps prefer Lawrence J. Burpee's "The Search for the Western Sea", that will-o'-the-wisp which lured so many of the early explorers to their death. It portrays the numerous expeditions which set forth from the East, South, and North, their fears, their hopes, their struggles, until the quest was won. Winnipeg has a considerable share in the romantic story. Let us plan to meet in Winnipeg.

A.G.N.

## ON THE USE OF CONCENTRATED POOLED HUMAN SERUM AND POOLED LYOPHILE SERUM IN THE TREATMENT OF SHOCK\*

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THE increasing importance of the problem of shock has stimulated much effort to determine the factors which may be responsible for its production. The question of etiology, however, is still controversial, as some believe that a toxic factor may be the main cause,<sup>1, 2, 28</sup> while others, principally Blalock and his school, are of the opinion that the syndrome may be explained on a basis of fluid loss alone.<sup>3, 4</sup> Still another group feels that a nervous factor may account for the production of symptoms.<sup>5, 31</sup> In contrast to this divergence of opinions, it is generally agreed that, whatever the underlying factor or factors may be, shock is characterized by a loss of plasma volume due to increased capillary permeability,<sup>6</sup> and in the majority of instances by a loss of plasma protein.<sup>7</sup>

The functions of the plasma proteins are of major importance in a consideration of shock and surgical problems in general. The albumin fraction is the most important, for it is the smallest in molecular size and as a result is the first to escape through the capillary wall when permeability is increased. Since the osmotic pressure exerted by a molecule is inversely related to its size it becomes apparent that of all the plasma proteins albumin exerts the greatest osmotic pressure. This is then lowered when albumin is lost and there is a resultant outpouring of fluid into the tissue spaces with the production of oedema. Besides maintaining osmotic equilibrium the proteins of the plasma are of importance in the promotion of active wound healing<sup>8</sup> and in the maintenance of the normal motility of the gastro-intestinal tract.<sup>9</sup> There is also evidence to show that adequate protein stores may inhibit visceral damage such as liver atrophy due to chloroform poisoning.<sup>9</sup>

The plasma proteins are depleted in many types of shock. Working with dogs, Fine and Gendel<sup>10</sup> showed that intestinal obstruction is accompanied by a marked loss of plasma pro-

tein when distension is a factor, and this has also been demonstrated in patients.<sup>11</sup> Similar changes have been reported in patients as a result of burns<sup>12</sup> or peritonitis<sup>10</sup> and in experimental shock produced in dogs by cooling of the peritoneum.<sup>13</sup>

Since reduction of the blood volume eventually leads to circulatory collapse the problem of intravenous therapy is of the utmost importance in the treatment of shock. Moon<sup>6</sup> has shown that hæmoconcentration, as evidenced by an increase in hæmoglobin, may precede the fall in blood pressure by as much as three to four hours. It is obvious that valuable time will be gained in establishing a diagnosis if hæmoglobin determinations are made instead of relying on clinical signs and decline of the blood pressure. The value of early treatment is well known, and the clinician has the choice of giving saline, human serum or plasma, or whole blood. Weech and Ling<sup>14</sup> have shown that in patients with moderate hypoproteinæmia, oedema can be produced by the administration of saline. The danger of giving large amounts of saline to surgical patients with hypoproteinæmia has been emphasized by Maddock and Collier<sup>15</sup> and Minot and Blalock.<sup>20</sup> For example, it is not uncommon to administer as much as 3,000 c.c. of normal or 5 per cent glucose saline in a day. This contains 27 g. of salt which is approximately three times greater than the average daily requirement. This can be avoided by carrying out the determination of the hæmoglobin and the plasma proteins, and by giving large amounts of saline only in cases where plasma protein is not diminished, such as in high intestinal obstruction with marked vomiting or in cases where diarrhoea is a factor. As a means of restoring the blood volume, the choice of serum or plasma in preference to whole blood offers many advantages. Both may be kept for much longer periods of time than whole blood without any deterioration. The liquid forms must be kept in the ice-box, but the dried lyophile preparation may be left at room temperature. Either

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† Aided by a grant from the Banting Research Foundation.

may be given at once, since the necessity of typing is obviated and reactions which may occur are not due to incompatibility.<sup>19, 20</sup>

Finally, restoration of plasma volume with serum or plasma does not tend to overburden the circulation with an over-abundance of red blood cells. Even when hæmorrhage has oc-

curred the giving of a small transfusion of plasma or serum immediately may be of great benefit until the patient is typed and whole blood can be administered.

In order to evaluate the efficacy of serum in the treatment of shock and to note the incidence of reactions, two types of pooled serum

TABLE I.  
RESULTS OF ADMINISTRATION OF POOLED CONCENTRATED SERUM TO FOURTEEN PATIENTS

No.	Age	Sex	Condition	In shock when serum administered	Amount	Reaction	Remarks
1	54	M	Vomiting following gastrectomy. It was thought there might be edema of stroma secondary to low plasma protein. Total protein 5.7.	No	50 c.c. + 150 c.c. normal saline	++++	Patient went into profound shock, with hæmoconcentration, low B.P. cyanosis, etc. Recovery.
2	48	M	In shock following bone resection, a long operation with much trauma and considerable hæmorrhage.	Yes	100 c.c. (concentrate)	++++	Patient went into deeper shock with further fall of B.P. coincident with serum. Death.
3	54	M	Bleeding peptic ulcer and thrombosis of femoral artery. Hgb. rose from 70 to 82 in 3 hours before serum was given.	Beginning	100 c.c. + 500 c.c. normal saline	++++	Chills, cyanosis, drop in B.P. in $\frac{3}{4}$ hours after serum was begun. Death.
4	40	M	Dehydrated. (Hgb. 127) from diarrhoea of gastrocolic fistula. Operation, colostomy.	Yes	100 c.c. + 150 c.c. normal saline	....	No reaction. Recovery.
5	63	M	Falling B.P. following supra-pubic cystotomy.	Beginning	100 c.c. + 350 c.c. normal saline	....	No reaction. Recovery.
6	66	M	Shock following supra-pubic cystotomy; at autopsy — coronary thrombosis.	Yes	100 c.c. + 250 c.c. normal saline	....	Serum given terminally; no ill effect observed. Death.
7	40	M	Perforated gastric ulcer, generalized peritonitis. Hæmoconcentration marked.	Yes	300 c.c. + 3,000 c.c. normal saline	....	No untoward effect as far as could be determined. Death.
8	32	M	In shock following spinal anaesthesia. Gastrojejunostomy.	Yes	200 c.c. + 1,750 c.c. normal saline	....	No untoward reaction. Recovery.
9	45	M	Strangulated hernia, diarrhoea, peritonitis, marked hæmoconcentration.	Yes	450 c.c. + 3,750 c.c. normal saline	....	Rise in pulse coincident with giving of serum; no untoward reaction observed. Death.
10	50	F	Given serum because of refusal to eat. Patient had renal tuberculosis.	No	150 c.c. (concentrate)	+++	Immediate symptoms, headache, backache, feeling cold, sweating, nausea and vomiting. Recovery.
11	50	M	Bleeding from peptic ulcer.	No	100 c.c. + 200 c.c. normal saline	....	No reaction. Recovery.
12	24	F	Congestive cardiac failure.	No	50 c.c. (concentrate)	....	No reaction.
13	26	F	Lymphatic leukaemia; given serum (50 c.c.) on September 24th, 28th, 29th and October 31st.	No	50 c.c. (conc.) 50 c.c. " 50 c.c. " 50 c.c. "	++++	Reaction with last serum, chills, feeling of impending death. Recovery.
14	45	F	Burns. Serum given terminally.	Yes	50 c.c. + continuous saline	....	No untoward reaction. Patient died while serum was being given.





were investigated, both of which were supplied through the courtesy of Professor C. H. Best and the Connaught Laboratories in Toronto. The first preparation was made by placing pooled serum in collodion membranes and concentrating to approximately one-third the original volume by a modified Thalhimer<sup>17</sup> method. The second "lyophile" preparation differed in that the serum was evaporated to dryness from the frozen state.

Where possible a specimen of blood was removed from the antecubital vein before any therapy was instituted. In some cases, when an extensive operation was to be performed, several pre-operative specimens were taken. This offered the advantage of a base line for the interpretation of subsequent results. The blood was kept from clotting by the addition of heparin. All determinations, hæmoglobin, hæmatocrit and plasma protein, were made

from the same sample, and all can be done within fifteen minutes. Hæmoglobin determinations were carried out, using the Evelyn photoelectric colorimeter.<sup>18</sup> Although hæmatocrit readings are of value as a check on the hæmoglobin they are not necessary for practical purposes. Scudder<sup>7</sup> has recommended using the specific gravity method for whole blood as a means of following hæmoconcentration. We have tried this method and find that, in comparison with hæmoglobin determinations, it has several disadvantages, in that it is more cumbersome, takes longer to do, and offers a greater probability of personal error. Therefore the use of simple hæmoglobin determinations is recommended in preference as a means of following hæmoconcentration easily and accurately. In the case of hæmorrhage occurring, with unknown quantities of blood loss taking place before the first determination or between two determinations, it is obvious that

Fig. 1. Case 1.—March 25, 1940. Operation: gastrectomy. Because of continued nausea and vomiting it was thought that the patient might have œdema of the stoma secondary to low plasma proteins. To increase his blood proteins he was given 50 c.c. of concentrated serum in 150 c.c. normal saline. As shown by the chart he went into profound shock with hæmoconcentration, cyanosis, sweating, drop in blood pressure, and unconsciousness following the infusion of the serum. March 26, QRS, complexes of very low voltage.

After he recovered from this unfortunate accident the patient's gastric symptom subsided and he was fairly comfortable during the remainder of his stay in hospital. Discharged on April 4, 1940, cured.

Fig. 2. Case 2.—October 17, 1940. Operation: bone resection. In 1915 the patient fractured his left tibia. This fracture was fixed with plate. On October 11, 1940, he sustained a fracture at the site of the plate. Admitted for bone-graft repair.

Operation, October 17, 1940. Cyclopropane anæsthesia from 9 to 11 a.m., during which time the old plate was removed, the bone curetted, and a graft from the left femur prepared. It was estimated that about 500 c.c. of blood might have been lost during these procedures. From 11 to 11.30 a.m. nitrous oxide anæsthesia was given while a plaster cast was applied. Prior to operation his blood pressure was 150/90. A hæmoglobin estimation was not made. When the patient was returned to the ward at 11.30 a.m. he was in shock with cyanosis, cold skin, and unobtainable blood pressure. Saline was immediately given and his blood pressure rose as shown on the chart to 70/40. With the introduction of 100 c.c. concentrated serum his blood pressure fell to 50/10 returned to 65/40, and then gradually declined. During this time the clinical symptoms of shock deepened. Death occurred at 5 p.m. the same day.

Autopsy.—Abdominal viscera appeared normal. No venous engorgement. The stomach was markedly dilated with gas. Heart and lungs normal. Spleen small. Kidneys, liver and adrenals normal. Abdominal parietes pale resembling that seen in hæmorrhage.

Fig. 3. Case 3.—This patient was admitted with a twenty-four hours' history of mild pain and numbness of left leg, vomiting, and bloody stools. An arteriogram showed thrombus of left leg extending above Poupart's ligament. Diagnosis: probable mesenteric thrombosis.

Since he had complained of bleeding and the hæmoglobin had increased from 70 to 82 within three hours he was given intravenous saline and 100 c.c. of concentrated serum slowly. He developed a marked reaction with chills, cyanosis, and a drop in blood pressure about three-quarters of an hour after the serum infusion was started, from which he did not recover.

At autopsy no mesenteric thrombosis was found. There was a duodenal ulcer which had ceased to bleed. There was a femoral thrombosis. No cardiac abnormality present. No cause for immediate death was found.

Fig. 4. Case 4.—September 25, 1940. Operation: ascending colostomy. The patient was admitted for treatment of gastrocolic fistula with diarrhœa. He was markedly dehydrated and emaciated. Within ten days prior to operation (ascending colostomy) he was given seven transfusions to prepare him for the operation. During the operation he went into shock. He was given saline and 100 c.c. concentrated serum, with recovery. No reaction to the serum.

Fig. 5. Case 5.—October 28, 1940. Operation: suprapubic cystotomy. The patient was given 100 c.c. of concentrated serum in 5 per cent glucoso saline because of falling blood pressure. No untoward reactions to serum. Recovery uneventful.

Fig. 6. Case 8.—November 6, 1940. The patient went into shock (drop in blood pressure, cyanosis, sweating, restlessness and semi-coma) following spinal anæsthesia (nupercaine). No pre-operative hæmoglobin determination was made so that it is impossible to say whether 97 per cent represents hæmoconcentration, although all subsequent hæmoglobin tests were 90 per cent. He was given ephedrine and pitressin intravenously for the first time as his blood pressure was rising. An intradermal injection, November 9th, of 0.1 c.c. of concentrated serum No. N.C. 512 34-1, July 16, gave no reaction. Recovery uneventful.

neither of these two methods will measure the degree of hæmoconcentration accurately.

The determination of plasma specific gravity on the other hand is a rapid means of ascertaining the amount of plasma protein. A small amount of plasma is all that is necessary and this is readily obtained from the supernatant layer of the hæmatoerit tube. The specific gravity is then determined in the falling-drop apparatus. Once this has been ascertained, it is readily converted into plasma protein using Weech's formula.<sup>19</sup> The apparatus and procedure have been amply described by Seudder.<sup>7</sup>

Hæmoglobin and plasma protein determinations are of great value when considered in relation to each other. If, for example, a fluid approximating the composition of plasma is lost, as is frequently observed in shock due to burns, the protein content of the plasma remains more or less the same, but the hæmoglobin will be markedly increased due to the relative hæmoconcentration. On the other hand, loss of water and salt, such as occurs in high intestinal obstruction with vomiting, leads to an increase in both the hæmoglobin and plasma protein concentration. It is obvious that the former condition would be benefited by plasma transfusion, whereas the latter would require saline.

#### RESULTS, USING POOLED CONCENTRATED SERUM

The first group of patients received concentrated pooled human serum in both the concentrated form and in normal dilution. There were 14 cases in all, and of these 9 were in impending or actual shock when the serum was administered. Of the 14 cases studied, reactions were observed in 5, three of which were very severe. The results are summarized in Table I and details are shown in Figs. 1 to 6. In case 1, not in shock, the administration of 50 c.c. of concentrated serum, made up to normal by the addition of 100 c.c. of normal saline, and of the same type (Universal O) as the recipient's serum was followed by profound shock (see Fig. 1). The serum used in this one case was an earlier preparation not of the pooled type. On the following day 10 c.c. of this serum was injected intravenously into a rabbit. No ill effects were observed. The remaining cases were all given pooled concentrated serum in amounts of 50 to 450 c.c. Three of these received the serum in the undiluted

form, whereas in the remainder it was first diluted to normal. Severe reactions were observed in cases 2 and 3 (see Figs. 2 and 3) with death following shortly after administration of the serum. Moderate reactions were observed in two cases (Nos. 9 and 10) not in shock.

Nine of the patients tolerated the serum without any reactions, and of these 7 were definitely improved. The two remaining patients died, one of an acute coronary thrombosis, and the other of peritonitis. An example of the effects of treatment is shown in Fig. 4. This patient (No. 4) went into shock following operation. His hæmoglobin was 130 per cent and the plasma protein was 5.4 g. per cent. He was given 100 c.c. of concentrated pooled serum and 1,500 c.c. of normal saline, and, as will be observed, the blood pressure was restored to normal limits within half an hour. A subsequent hæmoglobin reading (12 hrs.) was 117 per cent, and in 24 hours it was 107 per cent. The plasma protein remained at 5.2 g. per cent, indicating that there was no further loss of protein.

An interesting observation was made in case 13. This patient, with leukæmia, was given 50 c.c. of concentrated serum on September 24th, 28th, and 29th. No reaction was observed. Owing to a delay in obtaining more serum, she did not receive the next injection until October 31st, when she was again given 50 c.c. This was followed by chills, fever, and a fear of death within several minutes. Tests for skin sensitivity to the same batch of serum showed a reaction in concentration of 1 to 100, a slight reaction to fresh serum diluted 1 to 10, and no reaction to normal plasma diluted 1 to 10. This case then raises the question as to whether partial denaturation of the proteins may occur during the process of preparation. If such were the case serious consequences might result since repeated administration of serum may then sensitize a patient to human serum, with the production of a violent reaction upon subsequent administration.

From the results of treatment with concentrated pooled serum in this small group of 14 patients, 5, or approximately 35 per cent, developed reactions which in two instances were followed by death shortly after the administration of the serum (cases 2 and 3). The nature of these reactions is obscure. They occurred irregularly and unpredictably.

## RESULTS USING POOLED LYOPHILE SERUM

A second group of 16 patients was given intravenous injections of lyophile serum. Lyophile serum differs from concentrated serum in that it is evaporated down to absolute dryness soon after separation from the blood, the end-product of which resembles brown sugar. It is readily soluble in water and derives the name "lyophile" from this characteristic.

Because of the high percentage of reactions encountered when concentrated serum was administered to patients in shock, it was decided to administer this second type of serum to relatively normal persons or at least to patients definitely not in shock, and the serum was always given in normal concentration.

To a sterile bottle of lyophile serum (representing 300 c.c. of serum) 270 c.c. of pyrogen-free distilled water were added under sterile conditions. Within 10 to 15 minutes it was ready for administration. The pulse, blood pressure, temperature and respirations were followed in all instances at frequent intervals up to six hours. Fourteen patients received one transfusion of 300 c.c. each, and one patient received one transfusion of 550 c.c. In no instance were any severe reactions observed, although minor reactions, which consisted of urticaria in one case, rise of pulse and temperature in another, and a feeling of tightness about the chest in two others, were noted. The last ten transfusions were administered at a rate of 15 c.c. per minute.

## DISCUSSION

The striking difference in the results obtained in the use of the two types of serum must be considered in relation to the condition of the groups of patients and the method of preparation of the serums. For example, 9 of the fourteen patients in group one were in shock; in the second group treated with the lyophile preparation, however, all were in relatively good health. It may be that what appears to be a minor reaction in a healthy person could be a severe reaction in a patient who is in shock. Whether this is the case or not will have to be proved by the administration of the lyophile serum to cases of shock; differences in the method of preparation of the two types of serum may also be of importance.

A survey of the recent literature on the use of plasma and serum in the treatment of shock reveals the following facts. Plasma, either unprepared, concentrated, or lyophilized, has been

used by a large number of workers, the majority of whom have not observed any untoward reactions. Strumia, Wagner and Monaghan<sup>20</sup> have used normal citrated plasma in a large number of cases with good results. They claim that they had to abandon the use of serum because it gave so many reactions. The same conclusion was reached by Scudder,<sup>21</sup> Fine and Gendel,<sup>10</sup> and by Brennan.<sup>22</sup>

On the other hand, a consideration of the use of serum either in patients or in the experimental animal reveals that with few recent exceptions most workers have observed so-called serum reactions. An incidence of 25 per cent reactions was noted by Levinson, Neuwelt and Necheles.<sup>23</sup> Recently Buttle *et al.*,<sup>24</sup> in a survey of the use of various substitutes for blood in therapy, came to the conclusion that plasma was by far the best, and that serum gave too many reactions.

Best and Solandt<sup>16, 17</sup> have advocated the use of serum in preference to plasma, and have put forward evidence supporting this view both from animal experimentation and administration to human beings. Perhaps the best evidence has been presented by Brown and Mollison<sup>25</sup> who treated 91 cases with either concentrated or normal pooled human serum. They noted 19 reactions ( $\pm 20$  per cent). Using plasma, they observed somewhat the same percentage ( $\pm 26$  per cent), and came to the conclusion that either plasma or serum may be used if they are properly prepared. Long<sup>26</sup> treated 21 cases of shock with lyophile serum and observed no reactions.

Apparently, there are advantages in the preparation of serum as compared to plasma. The presence of fibrin and anticoagulant in the latter make evaporation quite difficult.<sup>27</sup> Where transportation and weight are major factors, the lyophile product offers the greatest advantage, and it, furthermore, will remain in good condition at room temperature. For general use in hospital, however, it would seem that removal of plasma from citrated whole blood (previously kept in a bank) offers a simpler and more economical plan.

Although the evidence is still confusing, it is felt that the majority of workers using plasma have in general noted considerably less reactions than those using serum (untreated). Further, the type of reaction observed in case 13 (Group 1) in whom no symptoms occurred until the patient had received several pre-

liminary transfusions of concentrated serum must be considered seriously in the light of Seudder's findings.<sup>21</sup> Using the electrophoretic method of analysis, he noted that changes occurred in the proteins of lyophilic serum, whereas none were observed in plasma which had stood for several months.

### CONCLUSIONS

Thirteen cases, 5 of whom were in shock, were treated with pooled concentrated human serum, and one additional case received concentrated typed human serum. Reactions to the serum were observed in 5, or 35 per cent, of the cases, and death followed in two of these. In the 9 cases in which no reaction was observed the results of serum therapy were beneficial in seven. Because of the frequency and nature of the reactions it is felt that this type of serum is contraindicated in the therapy of shock.

Sixteen patients, not in shock, were given transfusions of pooled lyophilic serum. No severe reactions were observed.

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## PROBLEMS IN THE PRESERVATION OF BLOOD

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THE visible changes that occur in blood during storage have been described by many authors, but it may be well to recapitulate them.

Sedimentation of the cellular elements in blood commences almost immediately blood is drawn. The rate varies with different bloods and is influenced by factors such as the composition of the diluent or preservative, which may influence cell volume, and by factors which influence specific gravity and viscosity, as, for example, temperature and the degree to which the blood has been diluted. In most specimens sedimentation of corpuscles is usually fairly complete within 36 to 48 hours. White cells and platelets, particularly the latter, settle out much more slowly, and many break down before sedimentation is complete. Many are entrained by

the corpuscles during their sedimentation, the distribution throughout the red-cell mass being greatest at the top and diminishing rapidly as one proceeds downwards. The remaining leucocytes and platelets settle out in the course of a few days to form a thin whitish layer on top of the red cells. Because of the tendency of these elements to agglutinate the layer soon becomes consolidated into a membrane. In centrifuged samples the white-cell layer becomes sufficiently compact to be removable *en masse* with a forceps or by aspiration. If, after a few days' storage, a fragment of the layer be stained and examined under the microscope it may appear as a mat of straight fibrin shreds enclosing the surviving leucocytes and platelets, chiefly lymphocytes. Once consolidation of the white-

cell layer has taken place, it is impossible to disperse the cells individually again by agitation; at best the film may be broken into small fragments. The tendency of white cells, and platelets to agglutinate and to form a cohesive membrane appears to be more marked in some species than in others.

It is to be expected that autolytic changes and hence disintegration during storage should occur more rapidly in the nucleated elements. The polymorphonuclear cells begin to break down early and almost completely disappear within seven to ten days. The platelets also are easily destroyed. According to some authors they disappear within a matter of hours or a few days, but our observations agree with those of Dubash, Clegg and Vaughan,<sup>1</sup> that a fair proportion may survive for two or three weeks. Their survival is influenced also by the manner in which blood is collected, the composition of the preservative, and by conditions of storage. Of all the white cells, the eosinophiles and monocytes are the most stable, many surviving six weeks to two months.

The disintegration of leucocytes and platelets in stored samples is indicated by an apparent swelling of the white-cell layer and its becoming "fuzzy", "buffy" or "woolly" in appearance, usually about the tenth to the fourteenth day of storage. Diffusion of free hæmoglobin into the plasma often becomes detectable at that time also. Hæmolysis actually begins quite early in storage, but diffusion of hæmoglobin into the plasma is hindered until the white-cell layer begins to disintegrate. Unless the red cells be resuspended and allowed to settle again the redness of the plasma cannot be taken as a criterion of the condition of the sample.

That hæmolysis during storage is largely the consequence of osmotic changes has been shown by Maizels and Whittaker,<sup>2</sup> who have observed that the corpuscles gradually increase in volume and ultimately burst. In the process of swelling the cell becomes more spheroidal in shape and decreases in its long diameter.<sup>3, 4, 5</sup> Earlier investigators had shown that soon after blood is drawn, the red-cell membrane, which normally is not very permeable to potassium ions and is practically impermeable to sodium, becomes altered so that these ions diffuse freely through it. An equilibrium is never established because, as Maizels and Whittaker<sup>2</sup> have pointed out, the colloid osmotic pressure within the corpuscle,

due chiefly to hæmoglobin, is greater than the colloid osmotic pressure of the plasma. Consequently, water continues to enter the cell. The attainment of equilibrium is further interfered with by the continual formation of new ions such as lactate, phosphate and ammonium, together with non-diffusible ones, from autolytic changes during storage.

Other factors may favour hæmolysis by weakening the red-cell membrane, as, for example, the slow liberation of ammonia<sup>2, 6, 7</sup> within the corpuscle, and possibly the formation in the plasma of hæmolytic products such as lysolecithin.<sup>5, 9</sup> Many investigators have shown the rapid increase in the fragility of cells in hypotonic saline solutions during storage, but to what extent fragility is attributable to the stretched state of the cell membrane from swelling, or, on the other hand, to lowered resistance of the membrane, has not yet been ascertained. Many substances added to preservative solutions, even in small amounts, tend to make the corpuscles less stable. There is some evidence that the disintegration of white cells and platelets also has an unfavourable influence on the red-cell membrane, possibly by liberation of proteolytic, lipolytic and other enzymes. Defibrination definitely increases the fragility of the corpuscles and it is possible that the gradual formation of fibrin which inevitably takes place during storage also may have a deleterious effect. This question will be discussed in a later report.

The beneficial influence of glucose in retarding hæmolysis was first reported by Rous and Turner<sup>10</sup> in 1916. Studying this action of sugar, Maizels and Whittaker<sup>2</sup> observed that in the presence of glucose the corpuscle is capable of undergoing a greater degree of swelling before hæmolysis occurs. Thus, according to these authors, red cells when placed in hypotonic saline (0.49 per cent) increase about 60 per cent in volume before breaking down, that is, hæmolysis occurs at a "critical cell volume" of 160 per cent of normal. Sucrose enables the cell to increase 72 per cent and glucose 83 per cent in volume before hæmolysis occurs. Other sugars also have a beneficial influence, but their order of merit varies with different bloods. In some instances fructose appears to be better than glucose, while in others sucrose is superior. In the majority of cases, however, glucose is best. Further, it is a more physiological substance. There is still a difference of opinion as to the optimal concentration of glucose.

A survey of the literature reveals little uniformity with regard to preservatives used in blood storage. It is interesting to compare the preferences of various workers in this regard (Table I).

In the past year or so there has been a departure from the use of complex saline preservative mixtures, as employed earlier by the Russian workers. The majority of investigators now use citrate alone or citrate-sodium-chloride mixture with or without glucose. In the experience of some workers, including our group, the addition of sodium chloride to the

erythrocytes can swell to a volume at which the membrane becomes permeable to hæmoglobin. Hæmoglobin, therefore, may escape from the cell without hæmolysis.

That the red cell membrane becomes permeable to potassium and sodium almost as soon as blood is withdrawn was shown by Dulière<sup>14</sup> and by Jeanneney and Servantie,<sup>15</sup> and has been confirmed by many others. The rate of diffusion of potassium ions from the cell and of sodium into the cell is almost linear for about ten days, after which it becomes progressively slower. There appears to be a relationship be-

TABLE I.

Authors	Diluent	Blood: Diluent	Final percentage citrate	Citrate percentage on basis of blood	Final percentage glucose
Rous and Turner <sup>10</sup> Moscow Institute	Citrate-glucose	3:7	0.76	2.3	2.7
Hæmatology "I.H.T." <sup>54,66</sup>	"I.H.T." citrate-salt mixture	1:1	0.25	0.5	None
Reed <sup>55</sup>	Citrate-glucose	1:3.4	0.8	2.7	2.7
De Gowin <i>et al</i> <sup>35</sup>	Citrate-glucose	1:1.5	0.25	0.64	2.8
Cook County Hospital <sup>17,56,57</sup>	Citrate (2.1%)-NaCl	7:1	0.3	0.3	None
Kings County Hospital <sup>58</sup>	Citrate-NaCl	6:1			None
Elliott <i>et al</i> <sup>59</sup>	"I.H.T." citrate-salt mixture	1:1	0.25	0.5	None
Barton & Hearne <sup>60</sup>	"I.H.T." citrate-salt mixture-glucose	1:1	0.25	0.5	2.5
Hamilton-Paterson <sup>61</sup>	Citrate-glucose	4:1	0.63	0.8	2.0
Maizels & Whittaker <sup>2</sup>	Citrate-NaCl	2:1	0.35	0.7	None
Downman <i>et al</i> <sup>12</sup>	Citrate-NaCl	2:1	0.52	0.5	None
Aylward <i>et al</i> <sup>62</sup>	Citrate-glucose	24:1	0.35	0.35	1.0
Lipp & Hubbard <sup>63</sup>	Citrate	10:1	0.2	0.2	None
Dubash, Clegg & Vaughan <sup>1</sup>		2:1	0.35	0.5	0.1-1.0
Edwards & Davie <sup>64</sup>	Citrate	9:1	0.4	0.4	None
Bushby <i>et al</i> <sup>11</sup>	Citrate-glucose	3:1	0.5	0.7	0.34
Brewer, Maizels, Oliver & Vaughan <sup>45</sup>					
Johns Hopkins Hospital <sup>65</sup>	Citrate-saline-glucose	2:1	0.35	0.5	1.0
	Citrate-glucose	10:1	0.45	0.5	None

preservative is undesirable, and optimal results are obtained by using a simple citrate-glucose mixture. Phosphate is of doubtful value, since it accelerates glycolysis and the breakdown of the cell membrane. Valuable observations on the influence of various preservatives may be found in the reports of Dubash, Clegg and Vaughan,<sup>1</sup> of Bushby and co-workers,<sup>11</sup> and others.<sup>2, 12</sup>

The ordinary fragility test affords a useful means of ascertaining changes in the stability of red cells during storage. It has been shown by many workers that from the time blood is taken the corpuscles become progressively less stable to hypotonic saline. After a few days some of the cells become unstable even to normal saline. The rate of increase in fragility can be correlated with changes in the distribution of the electrolytes and with the degree of swelling. According to Parpart,<sup>13</sup> and others,<sup>5</sup>

tween the diffusion of the two ions; in some cases this amounts almost to an ion-for-ion exchange. The rate of diffusion of potassium, however, is slightly greater, as might be expected from its relatively greater mobility. Storing blood under an atmosphere of carbon dioxide diminishes the rate of diffusion of both ions.<sup>16</sup> As shown later and confirmed by other workers,<sup>12</sup> the diffusion of potassium from the cell is slightly greater at lower temperatures. In the study performed by Eisenman and co-laborators<sup>18</sup> on the permeability of the erythrocyte to radio-potassium and sodium there was little evidence of exchange between potassium of the cells with potassium added to the serum. Dean and his colleagues,<sup>19</sup> on the other hand, found that the membrane was somewhat permeable to radio-potassium.

The influence of other ions on the diffusion of potassium and sodium has been demonstrated



by Davson<sup>20, 21</sup> in his studies on the erythrocyte of the cat. Thus, anions such as sulphate and citrate at the dehydrating end of the lyotropic series retard the passage of potassium into the cells and accelerate the escape of sodium. On the other hand, ions such as thiocyanate, at the hydrating end of the series, reverse these effects. No detailed studies of the influence of these ions have been made on the human red cell, but doubtless analogous effects would be observed. Since the stability of the corpuscle is markedly affected by osmotic readjustments and particularly by the increase in cell volume due to entrance of water, the importance of studying the influence of other ions is apparent. Investigations of earlier workers on the hæmolytic effect of various ions and their influence on the shift of water through membranes also have an important bearing on the question.

Ions such as phosphate, ammonium, lactate and others, liberated in preserved blood by autolysis, possibly exert a dual influence on the stability of the cell by increasing the osmotic pressure and by altering the permeability of the membrane. The liberation of inorganic phosphate from diphosphoglycerate and organic pyrophosphate has been studied extensively by Rapoport<sup>22</sup> and by Maizels and Whittaker.<sup>2</sup> According to the latter investigators the inorganic phosphate in the plasma is doubled in about two weeks and that inside the corpuscle increases to ten or twenty times the original level. The rate of diffusion from the cell, however, is relatively slow. Eisenman *et al.*,<sup>18</sup> using radiophosphate, have observed that the membrane is permeable to this ion at 38° C. but almost impermeable at 7° C., thus confirming the observation of Maizels.<sup>2</sup> Liberation of phosphate within the cells should therefore tend to attract water and promote swelling. Ammonia is liberated slowly in the erythrocyte, presumably from breakdown of adenosine and adenylic acid.<sup>6, 7</sup> According to Maizels and Whittaker<sup>2</sup> it increases from the normal concentration of 0.3 mg. per cent to about 5 mg. per cent in about seven weeks. The breakdown of the nitrogenous constituents of the cell, therefore, is relatively slow, and may further be retarded by storing blood under carbon dioxide.<sup>6, 16</sup> From what has been said regarding the diffusion of phosphate, and from the observation made by the writers and others that the diffusion of potassium from the corpuscle is

more rapid at low temperatures, it is apparent that temperature may determine as well as regulate permeability.

*Hæmoglobin.*—The stability of hæmoglobin is a consideration of fundamental importance in the preservation of blood. Two questions arise, namely, how long does hæmoglobin retain its normal oxygen-carrying capacity; and, secondly, how is the rate of oxygenation and dissociation affected by conditions and time of storage? Since hæmoglobin becomes useless after breakdown of the corpuscle these questions apply chiefly to hæmoglobin in the intact cells, and hence are of practical importance only within the useful period of storage.

From the time blood is collected, and particularly after sedimentation is complete, the corpuscles gradually lose oxygen and become venous in colour. They are always darkest at the bottom of the sample and only a shallow layer at the top in contact with the supernatant plasma remains oxygenated. After a few weeks the cells become extremely dark. This change occurs, though in lesser degree, even when samples are stored under oxygen. Apparently the hæmoglobin is not altered, at least within the first few weeks, since on resuspending the corpuscles in the presence of air they readily become oxygenated and assume the characteristic bright red colour. If the red cells are kept in suspension and in contact with oxygen during storage they remain oxygenated for a long time. In the course of two or three months, however, there is a noticeable darkening of the colour. The arterial colour is retained much better when blood is stored in containers with ground-glass stoppers than in rubber-stoppered tubes, thus suggesting that the loss of arterial colour may partly be due to escape of oxygen from the vessel.

The darkening of the colour in stationary specimens suggests several possible causes: (1) loss of oxygen due to instability of oxyhæmoglobin in the presence of increased acidity from glycolysis and other changes; (2) abstraction of oxygen by certain aerobic oxidative processes in autolysis; (3) change in ionic environment rendering oxyhæmoglobin less stable; and (4) deterioration of hæmoglobin with a resulting diminution in oxygen-carrying capacity. It has been shown by Fairley<sup>23</sup> that hæmoglobin tends to change to methæmoglobin during incubation, but this alteration is extremely slow at low temperatures. Another possibility under in-



vestigation at present is the formation of "pseudohæmoglobin", which, according to Barkan and Walker,<sup>24</sup> exists in normal blood and is higher in osmotically less resistant corpuscles, i.e., presumably the older cells. The evidence at the present time indicates that hæmoglobin is quite stable for a long time during storage and that slight differences observed in the rate of oxygenation may be due to the influence of changes in ionic composition<sup>25, 26</sup> within the cell rather than to alteration in hæmoglobin itself.

## METHODS

1. *Collection and storage of blood.*—For the collection of blood standard equipment such as the Baxter and Abbott types has been used whenever possible. The collecting procedure, however, has been modified slightly. For obvious reasons, where blood is to be collected in different preservative mixtures the closed method of bleeding is impracticable. The following procedure has been found most satisfactory. The required amount of anticoagulant in isotonic concentration, is placed in the container, and the mouth of the latter is covered with a double sheet of cellophano with a hole ( $\frac{3}{8}$  inch) in the centre large enough to admit the bleeding tube. After tying the cellophano around the neck of the flask the mouth is covered with a heavy pad of gauze, and the flask is autoclaved. Precaution is taken to avoid greatly reduced pressure at the end of sterilization so as to prevent loss of solution through sudden ebullition or of water by evaporation. If glucose is to be added to the preservative it is sterilized separately to avoid caramelization and may be added to the collection flask through the aperture in the cellophane, preferably before bleeding. A slight degree of caramelization has no adverse influence on the stability of the corpuscle during storage, and apparently is not toxic. However, it tends to produce an acid reaction in the solution and should be avoided, particularly when blood is to be used for transfusion.

The diluent or preservative used is a modification of De Gowin's, and is used in the following proportion:

Blood: 5 parts.

Isotonic trisodium citrate (3.2 per cent solution of dihydrate): 1 part.

Isotonic glucose (5.4 per cent solution): 1.5 parts.

The blood is collected without aspiration. The sphygmomanometer cuff is adjusted and the donor's arm sterilized with alcohol and iodine, and covered above and below the antecubital vein with sterile towels. After anesthetizing the region over the vein with a small injection of procaine, and the donor maintaining the cuff pressure at 80 mm., the needle (short number 13 or 16 with a short curved bevel and with a 7-inch length of stout gum-rubber tubing attached), is inserted and the blood conveyed into the bottle through the cellophane protection. The bottle is usually cooled in the refrigerator beforehand. If blood is to be collected in more than one container it is simple to clamp off the bleeding tube momentarily while the flasks are changed. Finally, the cellophano protection is removed from the bottle and a suitable sterile dispensing stopper or head is applied. The citrated blood may then be dispensed into smaller flasks containing various solutions to be tested, all flasks being protected with perforated cellophane as described above. For serial analysis it has been found convenient to dispense samples into 4-c.c. culture tubes. This ensures sterility and obviates sampling errors and the necessity of disturbing the entire lot of sample when a specimen is required. Aseptic precautions are observed throughout all manipulations. Samples are stored in refrigerators maintained at  $4 \pm 1^\circ \text{C}$ .

## ANALYTICAL METHODS

1. *Fragility.*—Fragility of erythrocytes to hypo- and hyper-tonic solutions of saline was determined by a modification of the method of Waugh and Asherman.<sup>27</sup> Hemolysis is expressed as grams of free hæmoglobin per hundred ml. of solution, or in per cent of the total hæmoglobin in the sample.

2. *Hæmoglobin.*—Hæmoglobin was estimated colorimetrically by the method of Evelyn,<sup>28</sup> or by the micro method of Wu,<sup>29</sup> adapted for use with the Evelyn photoelectric colorimeter. Hæmoglobin was also estimated on the basis of oxygen-carrying capacity by Van Slyke's manometric method.<sup>30</sup>

3. *Potassium.*—By a modification (O.F.D.) of the silver-cobalti-nitrite method of Zwemer and Truszkowski,<sup>31</sup> adapted for use with the photoelectric colorimeter.

4. *Sodium.*—By a modification (Stansfield and Denstedt) of the zinc-uranyl-acetate method, using the photoelectric colorimeter.

5. *Sugar.*—By Somogyi's<sup>32</sup> modification of the method of Shaffer and Hartman.

6. *Chlorides.*—By a micro modification of the method of Wilson and Ball.<sup>33</sup>

## EXPERIMENTAL

*Fragility of corpuscles during storage.*—The isotonic buffered Simmel's solution as used by Waugh and Asherman was adjusted to pH 7.35. From this solution dilutions were made so as to give a hypotonic series represented by 30, 40, 50, 60, 70, 80 and 90 per cent respectively, of isotonic. Hypertonic sodium chloride solutions represented by 200, 300 and 400 (per cent of isotonic), respectively, were also prepared.

Fragility was determined by adding 0.02 ml. of blood to 10 ml. of each solution in the above series in colorimeter tubes. After five minutes the tubes were centrifuged to throw down any unhemolysed cells, and the free hæmoglobin in the supernatant fluid was estimated colorimetri-

TABLE II.

Days storage	300	100 (isotonic)	Percentage of hæmolysis in buffered saline solutions (Simmel's)								
			90	80	70	60	55	45	40	0 (H <sub>2</sub> O)	
1		0	0	0	0	2	4	14	87	100	
2		0	0	0	0	4	10	33	87	100	
3		0	0	1	5	11	11	77	..	100	
4		2	..	5	9	17	39	85	..	100	
8		2	2	5	19	34	60	97	100	100	
10		5	5	24	35	60	84	94	100	100	
15		10	31	64	67	86	96	..	100	100	
22		..	61	85	87	94	94	94	100	100	
35		59	79	87	85	97	..	..	100	100	
50	12	75	..	..	95	..	..	..	100	100	

Blood-citrate (1:1/5) rotated at  $3^\circ \text{C}$ .

cally. A complete fragility curve was usually done on samples as soon as collected, and tests were made periodically thereafter, using test solutions 0 (water) 70, 100 and 300. Table II illustrates the increase in fragility and hence in hæmolysis with time, the values being ex-

pressed as percentage of the total hæmoglobin in the original sample.

The rate of increase in fragility with time is slower, the higher the concentration of the test solution. The presence of glucose in preservative solutions greatly improves stability.

As the volume of the corpuscle increases during storage, less additional swelling is required to cause hæmolysis. As shown in the previous table, the saline concentration at which hæmolysis begins gradually shifts towards "isotonic" and then into the normally hypertonic range. For purpose of discussion it is convenient to refer to the lowest concentration of saline that prevents additional hæmolysis, as the "critical saline concentration". The latter, therefore, is the concentration which is isotonic with the contents of the corpuscle at any given time, or, more strictly speaking, the concentration which is

in the supernatant solution may be estimated in the usual way, or, if concentration is very low, by means of the micro-chemical method of Wu<sup>29</sup> or of Barrett.<sup>34</sup>

As soon as preserved corpuscles show a tendency to hæmolyze in normal saline they will also break down, though to a smaller extent, in compatible plasma or serum. Presumably, also, they would undergo a similar destruction if transfused. Testing stored samples against fresh plasma or serum, therefore, gives an indication of their suitability for clinical use. Stored plasma or serum originally prepared from fresh blood is as good as fresh material for such tests.

In performing cell counts on stored specimens, Maizels<sup>2</sup> has recommended the use of plasma in place of normal saline, as diluent. As pointed out previously, however, some hæmolysis may occur even in fresh plasma or serum. If the

TABLE III.

Sample	Days storage	Total Hgb. grams percentage	Percentage hæmolysis in saline solutions								Percentage hæmolysis based on free Hgb. in plasma
			0 (water)	70	80	90	100 (isotonic)	200	300	400	
15A <sub>1</sub> *	72	9.7	100	91	85	74	33	16	14	10	12.5
18A <sub>1</sub>	41	10.4	100	73	53	42	12	12	8	8	8.6
19A <sub>1</sub>	33	10.0	100	58	42	30	5	5	4	3	5.0
22A <sub>1</sub>	21	8.8	100	35	19	9	3	3	2	0	2.3
23A <sub>1</sub>	7	8.0	100	10	5	4	3	0	0	0	2.5

\*A<sub>1</sub> = 1:1/2 dilution with citrate-glucose.

isotonic with the most fragile cells. As time goes on the critical concentration increases, and after a few weeks' storage may reach 2 or 3 per cent. The critical concentration will presumably be slightly hypertonic to the less fragile cells, and will be isotonic with plasma at the time. In the Table the values represent the total hæmolysis, that is, the degree of hæmolysis in the sample at the time, plus additional hæmolysis that may be caused by the test solution.

To ascertain the degree of spontaneous hæmolysis it is necessary to resuspend the corpuscles and either allow them to settle again or accelerate the process by centrifugation. The latter treatment invariably causes further cell breakdown. Spontaneous sedimentation, on the contrary, particularly in samples a few weeks old, is too slow to be practicable. One way of surmounting these difficulties is to do a fragility test on the suspended sample, using saline above the critical concentration. The free hæmoglobin

actual number of intact cells in the sample is to be determined, therefore, it is necessary to use a hypertonic diluent above the critical concentration.

Table III illustrates the increase in fragility to hypertonic saline with time. Comparing the degree of hæmolysis in the various solutions with that estimated on the plasma, *i.e.*, spontaneous hæmolysis, it will be observed that solutions 200 and 300 produce almost no additional cell breakdown.

*Influence of dilution on fragility of the cells.*—The influence of dilution on the stability of corpuscles does not appear to be widely appreciated, and relatively few workers have given this matter systematic study. Table IV illustrates the effect of different dilutions on the stability of corpuscles to normal saline and plasma on the sixtieth day of storage. All samples are from the same blood specimen.

In the above series isotonic citrate (3.2 per cent solution of the dihydrate) and isotonic

glucose (5.4 per cent solution) were used as preservative. The degree of hæmolysis, estimated on the plasma, is expressed in per cent of the total hæmoglobin in the sample. It therefore represents the percentage of red cells broken down.

It is noteworthy in the above and similar series that the omission of glucose from the preservative always results in earlier and increased breakdown of cells. Optimal stability is usually obtained with a 1:1/2 dilution, but in the occasional blood a 1:1 dilution gives as good preservation. In the above series, however, the latter dilution is definitely inferior. The 1:1½ dilution usually gives excellent preservation in the refrigerator, but almost invariably the corpuscles undergo extensive hæmolysis when in isotonic saline or in plasma of the same blood group. The extent of

glucose, was the most stable of the series. The 1:1 and 1:1½ dilutions broke down completely when mixed with normal saline or plasma. In the 1:1½ dilution the cells usually show a marked instability towards normal saline immediately the sample is taken. During the succeeding few hours osmotic readjustments occur which result in somewhat increased stability for a few days, after which the fragility increases fairly rapidly.

*The preservative influence of sugar.*—It is now generally agreed that the presence of glucose in preservative solutions is beneficial to stability of the corpuscles. Few workers have given this matter systematic study and those who have, do not agree. Thus, Dubash and co-workers<sup>1</sup> recommend a concentration from 0.25 to 1.0 per cent, Bushby and associates,<sup>11</sup> 0.25 to 0.5 per cent, and De Gowin<sup>35</sup> favours a final concentration of about 3 per cent.

Experiments with different concentrations of glucose in the present investigation have led to the conclusion that the degree to which blood is diluted and the concentration of the diluting solutions are more important than the actual concentration of glucose in the final mixture. It has been found, as expected, that dilution with hypotonic solutions increases fragility and that the use of isotonic or slightly hypertonic diluents increases stability of the corpuscles. Strongly hypertonic solutions are undesirable, since the corpuscles when mixed with plasma or serum take up water and burst. After much experimentation, the mixture: blood-citrate-glucose in the proportion 5:1:1.5 previously described (page 452), was found to give the most satisfactory preservation.

This gives a 1:½ or 2:1 dilution with isotonic diluent and a final glucose concentration of 1.08 per cent. Maintaining the above proportions and increasing the glucose concentration by adding hypertonic glucose had an adverse effect. Unfavourable results were obtained also by lowering the sugar concentration by adding less isotonic glucose, incidentally, changing the proportion of blood to diluent. It is obviously impossible to lower the glucose concentration and retain the above proportion and isotonicity. It was apparent from many experiments along this line that the degree of dilution and the use of isotonic diluent were more important factors than the final concentration of sugar in maintaining the red cell.

TABLE IV.

Sample	Dilution	Percentage hæmolysis by supernatant plasma	Additional hæmolysis in isotonic saline	Additional hæmolysis in fresh plasma
*14A <sub>0</sub>	1:0.2	15	28	2
14A <sub>1</sub>	1:0.5	4	14	1
14A <sub>2</sub>	1:1	6	54	30
14A <sub>3</sub>	1:1.5	4	81	39
14A <sub>4</sub>	1:2	10	90	4

\*Samples after 60 days' storage.

Key:

	Blood	Citrate	Glucose
A <sub>0</sub>	5	1	0
A <sub>1</sub>	5	1	1.5
A <sub>2</sub>	5	1	4
A <sub>3</sub>	5	1	6.5
A <sub>4</sub>	5	1	9

hæmolysis varies considerably with different blood specimens, but this dilution always favours fragility. A few additional examples are given in Table V.

The 1:2 dilution also often behaves in a curious manner. During storage the cells of this dilution generally break down more rapidly than those of the 1:1½ dilution but occasionally are more stable to normal saline and plasma. Why this improvement should be brought about by the higher dilution is difficult to explain. This improvement is not always seen; in fact, blood behaves erratically in these higher dilutions.

Blood specimen number 12 (Table V) was extremely unstable from the start. It was unique among all the specimens tested in this study in that the plain citrated sample without

TABLE V.  
INFLUENCE OF DILUTION ON STABILITY OF CORPUSCLES

Sample	Blood	Percentage hæmolysis in isotonic test solution after the following periods of storage																								80 days
	Diluent	0	1	2	5	6	7	9	10	12	14	16	22	24	26	28	31	32	33	34	42	44	56	62		
12A <sub>0</sub>	1:1/5	0			0							2											70			
A <sub>1</sub>	1:1/2	17			16							18											85			
A <sub>2</sub>	1:1	100			100							85											91			
A <sub>3</sub>	1:1½	100			100							55											94			
13A <sub>0</sub>	1:1/5		0	0												..								..		
A <sub>1</sub>	1:1/2		0	2												5								14		
A <sub>2</sub>	1:1		0	0												4								28		
A <sub>3</sub>	1:1½		0	2												5										
15A <sub>0</sub>	1:1/5		0			1.5			4	5.6								18						41		
A <sub>1</sub>	1:1/2		0			0			1.7	1.8								8.5						34		
A <sub>2</sub>	1:1		0			4.2			2.3	4.2								55						..		
A <sub>3</sub>	1:1½		3			5.5			33	41								99						..		
17A <sub>2</sub>	1:1		0					4.5		2.3	0		0						4.4			4.4				
18A <sub>0</sub>	1:1/5	0	0				0									..	25		19							
A <sub>1</sub>	1:1/2	3	0				0									0	0		0		4.8					
A <sub>2</sub>	1:1	7	0				0									0	0		14		13					
A <sub>3</sub>	1:1½	10	0				42									31	46		46		48					
19A <sub>1</sub>	1:1/2	..	0		0								?	0						2						
22A <sub>1</sub>	1:1/2		0		0			0		2		2	2													
23A <sub>1</sub>	1:1/2									3							7.5				6.5		14			
A <sub>3</sub>	1:1½									4							34				64		75			
24A <sub>1</sub>	1:1/2										0			3					8							
A <sub>3</sub>	1:1½										52			66					84							
25A <sub>1</sub>	1:1/2														4			5		3						
A <sub>3</sub>	1:1½														33			60		72						

Key to dilutions:

Samples: Blood  
A<sub>0</sub> 5 parts  
A<sub>1</sub> 5 "  
A<sub>2</sub> 5 "  
A<sub>3</sub> 5 "

Isotonic  
citrate (3.2%)

1 part  
1 "  
1 "  
1 "

Isotonic  
Glucose (5.4%)

0 parts  
1.5 "  
4.5 "  
6.5 "

In the earlier part of this investigation the protective influence of common sugars including glucose, fructose, mannose, sucrose, maltose and lactose, and of polysaccharides, such as glycogen, starch and dextrin, was studied. All have a stabilizing influence on the red cell, but the order of merit varies with different bloods. In a few instances fructose and sucrose gave better preservation than glucose, but not in marked degree. Sucrose apparently remains unchanged during storage, but in its presence glycolysis of the blood glucose is somewhat more rapid. Ordinarily, at low temperature (4° C.) the glucose falls rapidly to about 14 mg. per cent, and then gradually to zero after several days. Sucrose itself remains unchanged for weeks, as may be demonstrated by means of invertase (see Table VI). Sucrose, therefore, does not give rise to lactic acid during

storage, hence does not influence the pH of the sample. The main objection to sucrose is that when given intravenously it is non-utilizable and is quantitatively excreted into the urine, sometimes causing kidney damage. It will be observed that in the presence of an excess of glucose, glycolysis proceeds less rapidly than at the normal blood concentration.

It would appear that the addition of a polysaccharide such as glycogen or starch might assist preservation of corpuscles in two ways. First, a fairly constant glucose level might be maintained by the action of blood diastase, and, secondly, the polysaccharide being a colloid, might offset to some extent the colloid osmotic pressure within the cell, and thereby reduce the rate of swelling. That these substances do maintain the sugar level in blood during storage is

shown in Table VI. Glycogen is more rapidly hydrolyzed than the others and the enzymatic activity apparently diminishes after about the tenth day. The breakdown of starch and dextrin, on the other hand, proceeds at a more uniform rate.

TABLE VI.  
SUGAR VALUES ON STORED SAMPLES

Days	No added sugar	Carbohydrate added				
		Glucose	Glycogen	Dextrin	Starch	Sucrose
0	83	.	83	83	83	83
1	47				58	
2	27	497		83		
3					58	14
4	14					
5	trace					0
6	trace					
7		484			67	
8	0					
10		428				
11			149	79		
12					63	
14				58		0
18		428				
20			104			
25		412				
28			92			
29						224 after invertase
34				39	65	

The effect of polysaccharides on the red cells is always beneficial but variable. One objection to their use is the resulting increase in viscosity of the samples and the difficulty in resuspending the corpuscles homogeneously without prolonged agitation. Furthermore, filtration of such samples is difficult. These drawbacks were overcome by storing blood in vessels coated on the inside with a layer of starch or dextrin jelly. By so doing, glucose was maintained at a still higher level and preservation was good, but variable. The extra work involved in preparing containers, however, outweighs any merits of the procedure.

Gelatin and various gums added to citrate-glucose preservative or coated on the walls of the containers exhibited no special merit. Glycerol has an adverse influence on the stability of corpuscles. Numerous experiments were performed in which citrated blood was stored in dialyzing sacs of Visking sausage-casing surrounded with a jelled mixture of gelatin, citrate and glucose, or of dextrin containing citrate and amylase. In some instances the outer solution was changed periodically. In this way it was anticipated that the removal of lactic acid and other diffusible autolytic products might be beneficial. The behaviour of the samples was in-

teresting, particularly regarding the shift of water, but it was impossible to tell what was happening. Preservation under these conditions was not superior to that obtained in the ordinary way.

#### *Distribution of electrolytes in preserved blood.*

At the outset of this study an effort was made to correlate fragility with disturbance of the electrolyte balance of the corpuscles. Blood was stored in small tubes at 4° C. and at room temperature. It was anticipated that at the latter temperature similar but much more rapid changes would occur, thus making possible a speeding-up of storage experiments. At both temperatures some of the samples were kept stationary, while others were placed on a rotating shaft driven at a uniform rate of one rotation an hour by means of an electric clock. By this means the tubes were rotated about their horizontal axis and the corpuscles were maintained in loose suspension with a minimum of mechanical agitation. At suitable intervals tubes were removed for potassium, sodium and chloride analysis.

Potassium begins to escape from the cells almost immediately blood is drawn and at a rate which remains almost constant for about ten days. The rate may vary with different bloods and is influenced by the nature of the preservative and the degree of dilution. Although diffusion of ions is less rapid at lower temperatures, the loss of potassium from the cell is actually more rapid at 4° C., which indicates that the cell membrane is more permeable to this ion at the lower temperature. From about the tenth day the rate of diffusion diminishes when the plasma potassium reaches about 125 mg. per cent. Because of continual hemolysis an equilibrium between cells and plasma is never reached; hence the curve continues to rise for several months until almost all the corpuscles have broken down. Under the conditions of storage used in the present investigation the plasma potassium and other values invariably fluctuate after about the fourteenth day of storage. The potassium may rise only slightly but more frequently falls. In the majority of instances this change occurs about the twentieth day. The twenty-eighth day usually initiates another change marked by a rise in plasma potassium. This occurs repeatedly when blood is stored in narrow containers and is seen even when samples are rotated.

During the initial period of storage cell potassium and plasma sodium tend to exchange places, but diffusion of potassium is favoured by greater permeability of the membrane to this ion and by its greater mobility due to its lesser degree of hydration. If permeability were not influenced by dilution it would be expected that the latter should favour increase in plasma potassium and decrease the rate of fall in plasma sodium, particularly in undisturbed samples. Storing cells in the suspended state favours uniform change, whereas in the

superiority over the least favourable (blood-citrate 1:1/5) is not considerable.

The influence of lithium on fragility and on the diffusion of potassium and sodium was studied in several experiments. Lithium citrate (2.7 per cent) was used in place of sodium citrate in the regular preservative mixture. Its influence on fragility varied in different bloods, but in the majority of cases was practically the same as with sodium citrate up to about the twenty-seventh day, after which, almost invariably, the fragility increased

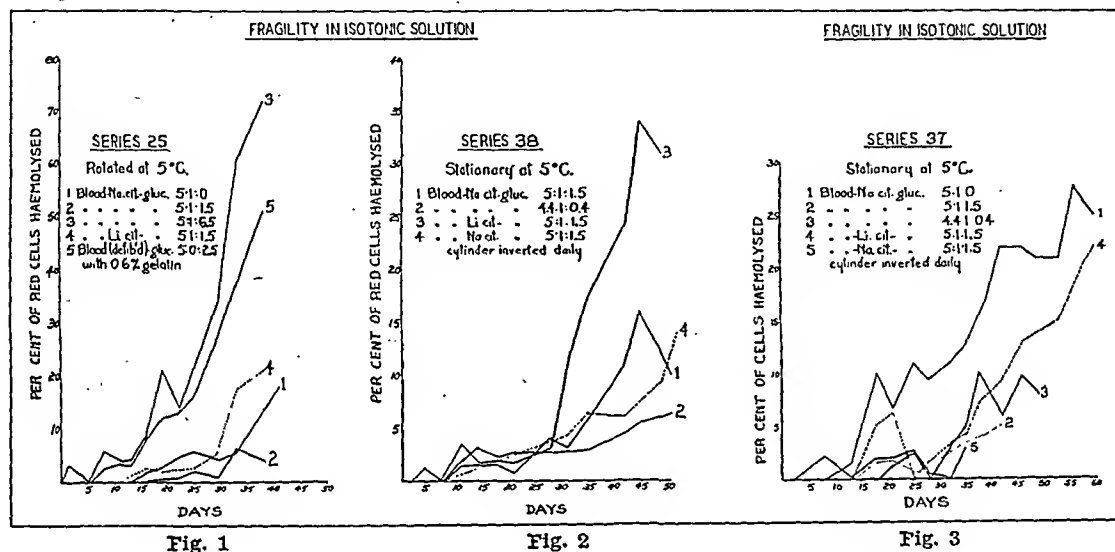


Fig. 1

Fig. 2

Fig. 3

packed condition each cell may have a slightly different environment of electrolyte. As might be expected, the plasma potassium in rotated samples reaches a higher concentration before the curve begins to level off than in stationary storage. A comparison of the rate of increase in potassium with the increase in cell fragility shows no relationship between the two processes. Potassium rises rapidly regardless of conditions of storage, whereas the stability of the corpuscle is greatly influenced by these factors. Plasma potassium, therefore, is not a useful criterion of the condition of stored blood.

To compare the influence of various dilutions on the shift of electrolyte it is necessary to calculate values back to a common dilution, *e.g.*, undiluted blood. This treatment is not strictly valid since it disregards other important factors. Considering the rate of escape of potassium in the most favourable dilution, *i.e.*, the most effective in retarding diffusion (usually 1:1) its

rapidly. Typical fragility curves are illustrated in Figs. 1, 2 and 3.

In view of the extensive changes in distribution of potassium and sodium during storage a disturbance in chloride might also be expected. Analyses, however, show that plasma chloride remains remarkably steady. Slight fluctuations were observed from day to day which at first were attributed to experimental error but later were found to be due to variation in the degree of oxygenation of haemoglobin. Because of difference in the air-space in different tubes the red cells are not oxygenated to the same degree in all samples when resuspended. The constancy of plasma chloride is shown in Table VII.

From the circumstance that the shift of chloride from the corpuscle during oxygenation is determined largely by the electrolytic dissociation of haemoglobin, it might be anticipated that deterioration of the latter during storage should be reflected in a change in

TABLE VII.  
PLASMA CHLORIDE (MG. %) DURING STORAGE

Sample	Days									
	1	2	4	7	11	12	18	27	28	59
16A <sub>1</sub>		368	368	368	368		362		368	368
16A <sub>2</sub>		380	374	374	368		362		351	374
16A <sub>3</sub>			380	368	345		357		380	374
16A <sub>4</sub>		351	351	328	328		345		345	351
22A <sub>1</sub>	450	456	450			456		450		
22A <sub>2</sub>	386	392	392			386		386		
22A <sub>3</sub>	386	380	380			380		374		

chloride shift on oxygenation. So far data are available on only one long term experiment and are incomplete. As presented in Table VIII, however, they illustrate the behaviour of chloride when samples are equilibrated with carbon dioxide, alveolar air, and oxygen.

TABLE VIII.

Day of test	Hæmolysis in sample using test solution 500	Plasma chloride after equilibration with		
		Carbon dioxide	Alveolar air	Oxygen
1st (fresh)	0	293	345	380
2nd	0	303	345	382
3rd	0	303	351	374
11th	0	293	345	363
41st	2	293	...	362

It is well known that the corpuscles on oxygenation lose chloride and decrease in volume. Hæmatocrit readings were obtained but are unreliable because of the hæmolysis which occurs on centrifugation in older specimens. From the above experiment the plasma chloride apparently remained steady in the series equilibrated with carbon dioxide and alveolar air, respectively, but fell significantly in the fully oxygenated series with time of storage. A decrease in the range of shift might be due partly to the increasing amount of free hæmoglobin in the plasma, but there is no parallelism between the degree of hæmolysis and chloride transfer. The change in ionic composition within the cell might also influence ionization of oxyhæmoglobin. From evidence submitted in the following section it is unlikely that hæmoglobin undergoes deterioration in oxygen-carrying capacity within the forty-one day period of the above experiment. More definite interpretation of the behaviour cannot be made until extended experiments have been com-

pleted. The influence of differences in degree of oxygenation on plasma chloride, however, is apparent.

In experiments on preserved blood investigating the influence of oxygenation on potassium and sodium distribution, no change was observed.

**Hæmoglobin.**—A comparison of the rate at which darkening in colour of the corpuscles occurs at the beginning of storage and the rate of exchange of potassium and sodium between the cells and plasma at that time, strongly suggests a relationship between the two phenomena. From what is known about the influence of various ions on the properties of hæmoglobin,<sup>25, 26</sup> the above inference also fits in very well with the observed diminution in rate of oxygenation of red cells after several weeks' storage. Other possible contributory factors have been mentioned in an earlier section.

To ascertain whether the oxygen-carrying capacity of hæmoglobin decreases during storage oxygen determinations were carried out by the Van Slyke method, and the calculated hæmoglobin values were compared with those obtained with the photo-electric colorimeter. The results on these bloods are given in Table IX. These three specimens, preserved with citrate alone, were chosen because they represent the least favourable conditions of storage.

TABLE IX.

Sample	Date collected	Date examined	G. percentage Hgb. by Van Slyke	G. percentage Hgb. by colorimeter
9A <sub>0</sub>	Feb. 6/40	Feb. 6		14.6
		May 3		14.7
		June 28	15.1	14.7
		July 22	14.2	13.2
9B <sub>0</sub>	Feb. 6/40	Feb. 6		14.5
		May 9	15.3 17.2	
		July 23	16.5	14.9 15.4
15A <sub>0</sub>	Apr. 30/40	Apr. 30	13.7	12.1
		May 10	13.8	12.3
		July 23	14.6	12.6

It will be observed that the hæmoglobin values, both by the Van Slyke and colorimetric methods, remain very constant for months, and, apparently, may increase slightly with time of storage. The discrepancy in the values obtained by the two methods is probably attributable to a slight error in the constant used in making calculations.



tions in the colorimetric method. The higher values underlined were obtained when the samples were oxygenated for an hour or more. Care was taken to minimize loss of water by evaporation during aeration. This increase above the original value was frequently observed in older samples. The lowest pH found was 7.1. It appears, therefore, that hæmoglobin in blood stored at 4° C. retains its normal oxygen-carrying capacity for many months beyond the useful storage period. Furthermore, the use of the ordinary Evelyn colorimetric method for estimating hæmoglobin in samples preserved for long periods at low temperatures is valid.

At higher temperatures of storage, hæmoglobin is slowly converted to methæmoglobin. Several days at room temperature are required before methæmoglobin becomes detectable spectroscopically, but at 40° the change is rapid.

Although the hæmoglobin in samples at low temperatures retains its normal oxygen-carrying capacity for many months, the diminution in the chloride shift may possibly indicate a slight change in the degree of ionization of hæmoglobin on oxygenation. After several weeks' storage, there is a slight but noticeable sluggishness in the oxygenation process. It is possible that the hæmoglobin itself is not altered but that the increased sodium and decreased potassium in the corpuscle may influence the rate of oxygenation. The observed retardation may be explained also by the circumstance that during storage the hæmoglobin is practically depleted of oxygen, whereas normal venous blood contains a large proportion of oxyhæmoglobin. It is to be expected, therefore, that stored samples should require a longer time for complete oxygenation. These points are at present being studied further.

The darkening of colour in stored samples can be prevented by allowing ample air space in the samples and by inverting the container once a day to keep the corpuscles in suspension. These specimens remain bright red for months. The slight agitation given does not damage the cells, nor does storage in the oxygenated state increase fragility. Diffusion of potassium and sodium, however, is facilitated.

*Other conditions of storage.*—From experiments in which blood was stored under carbon dioxide, oxygen, air, nitrogen and hydrogen, the order of merit on the basis of freedom from spontaneous hæmolysis appeared to be in the order given above. In some cases the gases

were bubbled through the samples in Nesbitt absorption flasks for a few minutes, and the pressure was brought to atmospheric pressure after cooling had taken place in the refrigerator. In other instances air simply was replaced by another gas. The bubbled samples all showed more rapid fibrin formation and hæmolysis.

In our experience, blood, however long preserved, remains odourless.

Storing blood in completely filled containers gives slightly improved preservation from the standpoint of appearance, but is not practicable because of the inconvenience and danger of contamination when the cells are to be resuspended.

An excellent statistical evaluation of the influence of various factors on the preservation of the corpuscle has been completed recently by Cook and associates.<sup>71</sup>

#### DISCUSSION

The storage of blood and its usefulness depend chiefly on three factors: (1) Stability of the corpuscle, i.e., the cell membrane; (2) Stability of hæmoglobin, and (3) The absence of toxicity or other factors that may cause reactions on transfusion. The second of these requires no discussion since, as already indicated, hæmoglobin is one of the more stable constituents of blood, and undergoes no deterioration within the period of storage feasible at the present time.

The problem of reactions is a very important one, but is not peculiar to the use of stored blood. De Gowin and associates, and others, have shown that the incidence of reactions from blood stored up to ten or fourteen days is no greater than from fresh blood. Refrigerated samples up to forty-five days old have been used without reactions. From an analysis of the results of hundreds of transfusions, however, they observe that the frequency of reactions increases with time after the tenth day of storage. While the majority of reactions are mild, it is important, nevertheless, to ascertain their cause.

Some authors<sup>35, 37</sup> have stressed the elevated plasma potassium in stored blood as a possible cause of reactions. This apprehension, however, has been dispelled during the past two years by the successful use of preserved blood in thousands of transfusions.<sup>35, 39</sup> It has been shown from animal experiments, further, that



the slow administration of potassium salts has little effect on the blood potassium, the excess of the ion being taken up rapidly by the tissues and released gradually into the blood again for excretion.<sup>40</sup> The increased plasma potassium in preserved samples, therefore, should tend to alkalize the recipient's urine. Many workers<sup>39</sup> administer alkali whenever possible as a precautionary measure prior to transfusion of stored blood and others<sup>68, 69</sup> strongly recommend alkalization of all patients before and after transfusion of fresh blood. In cases of disturbed potassium metabolism the use of preserved blood would be undesirable.

One factor observed early in the present study as being a likely cause of mild and obscure reactions is the presence in stored blood of white-cell residues and particles or masses of fibrin. Numerous workers<sup>64, 65, 67, 69, 70</sup> have commented on the precipitation of fibrin but some appear to disregard it. Fibrin may precipitate in the form of microscopic shreds and as a loose clot, usually in the upper zone of the sedimented red cells with tenuous filaments extending downwards. When the corpuscles are re-suspended the fibrin masses, along with the remains of the white-cell layer, are broken into small fragments. The majority of these can be removed with ordinary straining devices used in transfusion, but a considerable amount of the finer particles may pass through. To retain these, a material of closer mesh, for example, heavy weight Swiss bolting silk (12 or 13 XX) of 130 to 160 mesh to the inch, is required. To what extent the finer particles constitute a hazard is not known. It would appear from the extensive and successful use of stored blood without extra precautions that complete removal of the particles is not necessary.

Fibrin-formation takes place slowly during storage regardless of the anticoagulant used. Heparin is less effective than citrate or oxalate in retarding the process, and a combination of heparin and citrate is inferior to the latter alone. Other anticoagulants also are ineffective. Doubtless the disappearance of prothrombin during storage, as observed by numerous investigators,<sup>41, 42, 72</sup> is related to this problem. As a rule the rate of fibrin-formation decreases with increased dilution of the sample. Defibrination would appear to be a logical solution to the problem, but, as already pointed out,

this treatment markedly increases the fragility of the corpuscles. These questions will be discussed more fully in a later report.

The limiting factor in the preservation of blood by refrigeration is the instability of the corpuscle, *i.e.*, the cell membrane. Little is known regarding the nature of the change that takes place in the membrane almost immediately blood is drawn. Temperature has a marked influence, but restoring the temperature to 37° C. does not restore the normal impermeability to sodium and potassium. Maizels and Paterson<sup>43</sup> have submitted evidence that stored cells on transfusion undergo a sort of reconstitution with restoration of their normal chemistry within twenty-four hours. This, however, requires confirmation.

The influence of dilution on osmotic fragility of the red cell has already been emphasized. An extensive comparison of preservative solutions recommended by various workers has shown that dilution of blood with half a volume of isotonic diluent (citrate-glucose) gives optimal preservation in the majority of cases. Because of the differences in bloods there is no single solution that will give optimal results with all specimens. With many bloods the 1:1 dilution appears to be almost as satisfactory as the 1:½ dilution. We have found also that the 1:1/3 mixture used by Bushby and colleagues<sup>11</sup> is as good as the 1:½ during the first month. The latter dilution, however, appears to be generally the most satisfactory and tends to give a slower rate of fibrin precipitation than with smaller dilutions.

Larger dilutions, especially above 1:1, afford good preservation but tend to increase the fragility of cells to normal saline and to compatible plasma or serum. The instability to the latter is much less than to the saline but is considerable. Whether cells fragile to plasma at room temperature would break down if transfused has not been established, but is probable in view of the observations of Bushby and co-workers,<sup>11</sup> who followed the blood bilirubin after transfusion. It is noteworthy, however, that the Iowa group of investigators,<sup>38</sup> who have had very extensive experience in the use of stored blood, have used the 1:1½ dilution in hundreds of transfusions with complete success. Even if this dilution should increase fragility and give rise to some hemolysis *in vivo*, about 80 per cent of the red cells in a 500 c.c. transfusion would

have to break down before the free haemoglobin in circulation would exceed the renal threshold. This degree of destruction is extremely unlikely.

In the operation of many blood banks the redness of the plasma layer is still used as the criterion for judging the condition of samples. From what has been said previously it is apparent that the appearance of a sample in the refrigerator has little significance. In the present investigation the behaviour of samples toward fresh or stored plasma or serum (compatible) has been used for judging preservation. In the majority of cases 2.5 per cent saline gives fairly comparable results and eliminates the factor of compatibility. Tests of this kind make possible the detection of extreme fragility in specimens such as No. 12 (Table V) which appear to be quite well preserved, but may break down extensively on transfusion.

Opinions differ regarding the length of the safe and useful period of storage, but it is now quite generally accepted at least that blood stored up to 10 days is as efficacious as fresh blood. Some authorities<sup>44</sup> take this as the limit of useful storage, others 14 days,<sup>45, 46</sup> and some 18 days<sup>47</sup> or even more.<sup>11, 39, 48</sup> The Bureau of Health of New York City has tentatively adopted the 18-day limit.<sup>49</sup> It has been demonstrated repeatedly, however, that blood stored for much longer periods can be used with good results. De Gowin and Hardin<sup>39</sup> consider five days to be the safe limit in the case of citrated blood, but have used samples stored for over thirty days by their method, with beneficial results. Schaefer and Wiener,<sup>50</sup> using Ashby's technique<sup>51</sup> of transfusing Group O cells into an A or B recipient and following the proportion of non-agglutinable cells (O) in the recipient, observed that blood stored up to eight days survived as long as fresh blood, i.e., three to four months. Blood stored from ten to twenty days was found to survive from one to three weeks. Other investigators,<sup>43, 47, 52</sup> using the "M and N" method,<sup>53</sup> in which blood of group O type M is transfused into a recipient of group O type N, and the survival of the M cells followed by their agglutinability with rabbit immune serum (anti-M), have shown that there is scarcely any difference in survival of fresh and fourteen-day-old blood. In the case of the latter

about one-third of the transfused cells remained on the seventieth day.<sup>47</sup> It is possible that further improvements in methods of preservation may extend the useful period of storage.

#### SUMMARY

Among the factors that have a marked influence on the stability of the corpuscle during storage are the concentration of the diluent or preservative, and the degree to which blood is diluted. Optimal preservation is obtained with an isotonic citrate-glucose diluent using one volume of blood to one-half of diluent as follows:

Blood: 5 parts.

Isotonic (3.2 per cent) sodium citrate: 1 part.

Isotonic (5.4 per cent) glucose: 1.5 parts.

Good preservation is usually obtained over a range of dilutions, namely between 1:¼ and 1:1, but the 1:½ mixture has been found most satisfactory for bloods in general. Blood diluted with more than an equal volume of citrate-glucose undergoes no more haemolysis during storage than in lower dilutions, but is much more fragile to normal saline or fresh plasma. Since it is impossible to tell from the appearance of stored specimens how stable or fragile the corpuscles are, it is recommended that samples be tested against compatible plasma or a suitable hypertonic saline solution. This, at least will give some information as to how the corpuscles would behave on transfusion.

The oxygen-carrying capacity of haemoglobin remains unchanged during the period of storage feasible on the basis of survival of corpuscles.

We are grateful to the National Research Council of Canada for financial assistance in this investigation, and to Professor J. B. Collip under whose direction the work was carried on.

With a few exceptions the blood used in this study was contributed by members of the Montreal Voluntary Transfusion Service. We gratefully acknowledge the willing co-operation of this organization and particularly of those members who donated blood. We appreciate also the assistance of the Child Welfare Association of Montreal in arranging for donations.

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We wish to acknowledge also, helpful criticisms from Professor D. L. Thomson.

A full bibliography can be found in the reprints of this article.

## PEPTIC ULCER IN CHILDREN

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PEPTIC ulcer in children has been considered a rare condition, as only 36 cases have been reported.<sup>1</sup> Clinically and pathologically, peptic ulcers must be differentiated from other types of gastric ulceration common to childhood, such as those accompanying burns, malnutrition, melæna neonatorum, and acute infections such as meningitis, septicæmia, scarlet fever, etc. Post-mortem data of the incidence of gastric ulceration in children are not concerned usually with peptic ulcer but these other various types. This report deals with cases which pathologically and at times clinically resemble those found in adults.

The condition must be more prevalent than is realized. In nearly 10,000 cases of gastric and duodenal ulcers reviewed from the records of the Mayo Clinic, Proctor<sup>2</sup> found that there were only 3 children. But in 1,000 cases of gastric ulcer and 1,000 cases of duodenal ulcer he found that in 16 cases of gastric ulcer and 26 of duodenal ulcer the symptoms had been present since childhood. This is a collective incidence of 2 per cent, and it suggests that the diagnosis in many cases of children is being overlooked. Our own hospital records verify this conclusion. Prior to January, 1939, the youngest patient with peptic ulcer on record at the hospital and out-patient department was 17 years of age. All 8 cases presented in this article have been discovered since that date, probably not because the condition is more prevalent now, but because we have been searching for it.

Clinical diagnosis is difficult. This is especially true of cases under the age of ten years. Kennedy<sup>3</sup> states, "The signs and symptoms which are present may be few or many but are so diversified as to rob them of pathognomonic significance." I have found this statement to be uniformly true. Confusion is added by the fact that children under ten years of age are inaccurate in describing and localizing pain, and in designating areas of tenderness to the physician. They are particularly susceptible to suggestion, and for that reason should be asked no "leading" questions unless it is unavoidable.

The following series is composed of 8 children whose ages ranged from 6 to 14 years. There are 2 girls and 6 boys in the group. All ulcers were duodenal, except one (Case 3).

### CASE 1.

A male, aged 9, entered the hospital in November, 1939, with a tentative diagnosis of appendicitis. He had developed abdominal pain twenty-four hours before admission, which he described as a steady ache centered persistently around and above the umbilicus. He became nauseated and vomited once on the day of admission. During the three preceding years he had had several similar attacks, but none so severe as the present one. Between attacks he was free of abdominal discomfort.

*Past history.*—He had had varicella in 1933 and scarlet fever in 1935. The family history was irrelevant.

*Physical examination.*—He was a pale and poorly-nourished lad. The oral temperature was 101.2°. The tonsils were large but not inflamed or scarred. There was diffuse abdominal tenderness, more marked in the area of the umbilicus and right iliac fossa, but no rigidity. The rectal examination was negative. By the following morning tenderness could be elicited only in the epigastrium. The temperature was now normal.

*Laboratory.*—The urinalysis was negative. The white blood count was 4,150; the erythrocytes numbered 5,110,000, and the hgb. was 92 per cent. The sedimentation rate was 10 mm. in one hour. X-ray examination of the chest was negative. In the gastric analysis there was a free HCl of 17, total acidity of 50, and no occult blood.

For the next forty-eight hours, in spite of a soft diet, he consistently complained of nausea following meals. The stool contained occult blood (plus 2). Roentgenographic and fluoroscopic examination of the stomach and duodenum revealed an incisura and irregularity of the duodenal bulb characteristic of ulceration, but no definite crater. About one-fourth of the barium was retained in the stomach after five hours. He was placed on a modified Meulengracht diet.\*

Within three days he was asymptomatic and the abdominal tenderness had disappeared. One month later there was only a trace of occult blood in the stools. He had gained three pounds and looked well. Immediately following discharge a second roentgenographic examination revealed a marked diminution of the irregularity, but there was still a five-hour retention of one-fourth of the barium meal.

Two months after discharge he again entered the hospital complaining of continuous epigastric pain of two days' duration. The complaints, physical, and x-ray findings were the same as for the first admission. He was again started on a modified Meulengracht diet with colloidal aluminum hydroxide every four hours. Improvement was distinctly slower. It was two weeks before the abdominal tenderness disappeared. At the present time he is asymptomatic, gaining weight, and looking well.

### CASE 2

A male, aged 14, was sent into the emergency ward in September, 1939, with a diagnosis of appendicitis. For two and one-half months he had complained of intermittent abdominal pain occurring one to two hours before

\* Graduated ulcer diet, giving a choice of plain, orange or citrated milk.

meals and relieved by food. Although he could not describe the pain, he located it in the epigastrium and left hypochondrium. He had vomited only once, a week before admission. His appetite was good.

*Past history.*—He had had mumps, varicella and pertussis but no recent illnesses. The father had a peptic ulcer. The mother and two sisters were well.

*Physical examination.*—The tonsils were greatly hypertrophied and scarred. Examination was otherwise negative.

*Laboratory.*—The urinalysis was negative. The white blood count was 6,350; the red blood count 4,710,000; and hgb. 84 per cent. The blood Kahn test was negative. The gastric analyses were unsuccessful. Roentgenographic and fluoroscopic examination revealed that the duodenal bulb filled poorly and was markedly irregular throughout the examination, strongly suggesting ulceration. There was no retention of barium in the stomach after five hours.

He was placed on a modified Meulengracht diet with an alkaline mixture mid-morning, afternoon, and at bedtime. Arrangements were made for him to have milk at school. Three months later he admitted that he had not adhered to the diet, but insisted he had had no return of the abdominal discomfort. There was no abdominal tenderness. In the stools, however, there was plus 3 occult blood. X-ray examination now revealed no evidence of ulceration, although the duodenal bulb was hard to fill. He is now continuing on the Meulengracht diet with colloidal aluminum hydroxide between meals and at bedtime.

#### CASE 3

A female, aged 11, entered the hospital on December 4, 1939, complaining of abdominal pain and fever of two days' duration. She described the pain as a dull constant ache centred around the umbilicus. There was no nausea or vomiting. For three months she had had several similar attacks and had also experienced mild discomfort at bedtime and before breakfast in the mornings. Throughout the day she was quite comfortable. This pain was not relieved by food.

*Past history.*—In 1935 she had had measles and an attack of rheumatic fever. She had a mild recurrent attack of rheumatic fever in 1936 but none since. Her father had died of pulmonary tuberculosis, and the mother had just been discharged from the hospital with an arrested pulmonary tuberculosis. Her Mantoux test (1:1,000) was strongly positive, but an x-ray examination of the chest was negative. Her mother stated she was exceedingly conscientious about her school work, studied hard, and worried a great deal about her lessons and her mother's health.

*Physical examination.*—She was well-developed but thin. The admission temperature was 102°. The tonsils were small but scarred. Examinations of the lungs and heart were negative. The abdomen was soft and there was only slight tenderness just around the umbilicus in the midline.

*Laboratory.*—The white blood count was 18,000. Polymorphonuclears numbered 81 per cent; lymphocytes 13 per cent; and monocytes 6 per cent. The red blood count was 5,070,000 and the hgb. 91 per cent. The sedimentation rate was 50 mm. in one hour. Two days later the temperature dropped to normal, the white blood count to 7,750, and the sedimentation rate to 20. There was plus 4 occult blood in the stools. In the gastric analysis there was a free HCl of 45, a total acidity of 64, and only a trace of blood. X-ray examination of the chest revealed only a few thickened nodules at both right and left hilus. Roentgenographic and fluoroscopic examination of the stomach and duodenum revealed a small filling defect on the lesser curvature of the stomach, suggesting ulceration.

She was started on a modified Meulengracht diet. Twenty-four hours later the abdominal discomfort and tenderness disappeared and she has been asymptomatic since. Two months after discharge from the hospital, the roentgenographic examination was repeated. The previously reported irregularity, though not so pro-

nounced, was still present. Two months later no evidence of ulceration could be found. She is now on a general diet and symptomatically well.

#### CASE 4

A male, aged 12, entered the out-patient department in February, 1939, complaining of crampy intermittent abdominal pain over a period of two years. He definitely placed the position of the pain as mid-epigastric. Soda relieved the discomfort, but he had never tried food. The pain usually occurred at night. There was no associated nausea or vomiting, and there was no distress during the daytime.

*Past history.*—He had had scarlet fever and pneumonia in 1931, and an appendectomy in 1934, following an attack of acute appendicitis. His tonsils had been removed in 1936. Because of the resemblance to a Fröhlich's type of obesity he had been started on thyroid extract at that time. The family history was irrelevant.

*Physical examination.*—He was a fairly obese lad, weighing 105 pounds. Although the fat distribution was quite general, there was an accentuation in relation to the girdle area and breasts. The genitalia were infantile. Both testes were in the scrotum. There was no pubic or axillary hair. Mild epigastric tenderness could be elicited, but there were no other findings of importance.

*Laboratory.*—The stools were negative for occult blood and the urinalyses negative. The blood Kahn test was also negative. Roentgenographic examination showed evidence of duodenal ulceration at that time, and one month later a large ulcer crater was demonstrated in the duodenum. He was placed on a modified Meulengracht diet with magnesium trisilicate between meals and at bedtime. He became asymptomatic in two weeks and has been subjectively well since.

On re-examination in January, 1940, there was no abdominal tenderness. The blood findings were normal and there was still no occult blood in the stools. Roentgenographically, there was a "waist" involving the duodenum which remained throughout the examination. However, there was no residue in the stomach after five hours.

#### CASE 5

A male, aged 9, entered the outpatient department in December, 1939. For three months he had been losing weight and complained of being tired most of the day. His appetite was poor. For a year he had complained of intermittent pain in the knees and groins when walking, but during the previous three months they had occasionally been so painful as to wake him during the night. He had had innumerable colds and sore throats in the previous year. He also complained of vague abdominal cramps (no localization), constipation, frequency and dysuria, headaches, and blood in the stools. The last complaint had appeared only a week before admission. According to the mother the stools had been streaked with dark red blood but were not "tarry". He complained of some abdominal pain at night and sore stomach in the morning. He had suffered from enuresis since birth but the dysuria was a recent complaint.

*Past history.*—He had had pertussis as a baby and was told he had had rheumatic fever a year before. The attack was followed by pleurisy of short duration. The mother was well, but the father had a long history of undiagnosed "indigestion". A brother was in the hospital convalescing from a pneumococcal meningitis, and two sisters were at home, well.

*Physical examination.*—He was not so acutely ill as his history might signify. He was pale and undernourished. The tonsils were enlarged and scarred, and there was good evidence of recent infection. The cervical glands were hard and discrete but not tender. He had prominent glands in both axillae and inguinal regions, the latter set very tender. The abdomen was diffusely tender, more pronounced in the epigastrium and both lower quadrants. There was no rigidity. He was distinctly tender in both knees and hip joints and along the distribution of the left sciatic nerve. There was no

swelling of the involved joints. Rectal examination was negative.

**Laboratory.**—The stools were negative for occult blood. The white blood count was 11,000. Polymorphonuclears numbered 61 per cent, lymphocytes 32 per cent, monocytes 1 per cent, and eosinophiles 1 per cent. The red blood count was 4,800,000, the hgb. 100 per cent and the sedimentation rate 45. Platelets numbered 120,000. The blood Kahn test was negative. The urine showed plus 3 albumin and plus 3 white blood cells. Roentgenographic and fluoroscopic examination of the stomach and duodenum revealed an irregularity of the duodenum, suggesting ulceration. X-ray examination of the chest was negative and the Mantoux test (1:1,000) gave no reaction.

He was admitted into the hospital in January, 1940, for further observation. By this time he was improving. His sedimentation rate was now 18, but the white blood count was still 11,000. He had no fever. The joints were distinctly less tender. The urine continued to show albumin and pus, but no red cells or casts. The non-protein nitrogen was 29 mg. An intravenous pyelogram was essentially negative. Culture of the urine showed colon bacilli and streptococci. He concentrated the urine well. He was placed on prontylin and a bland diet. Two weeks later he had no complaints, although there was still some tenderness in the epigastrium. His appetite improved remarkably. The urine continued to show various amounts of albumin, but this proved to be orthostatic. On February 6th roentgenographic examination revealed no evidence of lesion in the stomach or duodenum. His tonsils and adenoids were removed before discharge. At the present time he is on a slightly restricted diet. There has been no return of symptoms.

#### CASE 6

A male, aged 9, entered the outpatient department in February, 1939. His chief complaint was epigastric pain of six months' duration. He complained so much at night that his mother could not understand how he slept enough to keep awake the next day. In the mornings he always had a stomach ache. "He ate incessantly all day long to keep his stomach from aching." For three successive winters a diagnosis of rheumatic fever had been made because he was feverish at night, but there were no joint pains or chorea. He had lost weight, the exact amount of which was undisclosed.

**Past history.**—He had had varicella as an infant, and a tonsillectomy was performed in 1938. The family history was negative.

**Physical examination.**—He was a pale lad, weighing but 55 pounds. The temperature was normal. With the exception of slight abdominal tenderness in the area of the umbilicus there were no positive findings.

**Laboratory.**—The blood Kahn test was negative. The sedimentation rate was 10. The urinalysis was negative and the stools contained no occult blood. Roentgenographic examination of the stomach and duodenum revealed a marked irregularity of the duodenum, suggesting ulceration.

He was placed on a modified Meulengracht diet and sent to a convalescent home. After one week he had no further abdominal distress. He was called back to the clinic in January, 1940, for re-examination. He now weighed 64 pounds and was feeling well. Physical examination was entirely negative. The stools contained no occult blood. Roentgenographic examination revealed no evidence of a lesion in the stomach or duodenum.

#### CASE 7

A female, aged 7, entered the out-patient department in March, 1939. She had complained of epigastric pain of an intermittent type for eight months. The pain occurred during the day most commonly following meals, and at times she would complain of pain during the night and early in the morning before breakfast. Occasionally she would become nauseated and vomit. Vomiting would relieve the pain. Her mother thought she was often constipated. Her diet consisted largely of foods

fried in olive oil and highly seasoned foods which the family relished.

**Past history.**—She had had varicella as a small child and a tonsillectomy in 1938. The family history was negative.

**Physical examination.**—She was a well-developed, well-nourished girl. There was a slight tenderness around the umbilicus but no rigidity. Examination was otherwise negative.

**Laboratory.**—The red blood count was 4,200,000 and the hgb. 74 per cent. The white blood count was 6,700 with 48 per cent polymorphonuclears and 52 per cent lymphocytes. The stools were not examined for occult blood. In the gastric analysis the free HCl was 30 and the total acidity 49. Roentgenographic examination of the stomach and duodenum revealed a slight amount of irregularity of the lesser curvature of the stomach near the cardia and some irregularity of the duodenum suggesting ulceration.

She was referred back to her physician for treatment, and was not seen again until January, 1940. She had been placed on a bland diet with Sippy powders between meals and at bedtime. Although she still had occasional attacks of abdominal pain they were much milder and farther apart. Examination of the blood and stools was now essentially negative. Roentgenographic examination revealed no evidence of irregularity of the stomach or duodenum.

#### CASE 8

A male, aged 11, was sent into the hospital on November 15, 1939, because of pallor and "tarry" stools. One year prior to admission he had complained of occasional abdominal pain following meals. Lying down seemed to relieve it. In the early part of January, 1938, he had had a severe attack of abdominal pain, necessitating a "hypo" for relief. Simultaneously the stools became almost black, although they returned to normal in two weeks' time. The pain also disappeared entirely, and within a month he was well. In September, one month before admission, the stools again became tarry and it was noticed he was very pale. No pain accompanied this attack. Two weeks before admission the stools again became black and the pallor very marked. He felt well, however, and had no complaints.

**Past history.**—He had had measles and a number of colds and sore throats, but none recently. The family history was negative.

**Physical examination.**—He was a pale and thin lad. The tonsils were large but not inflamed. He had two carious teeth. The tongue was heavily furred. No abdominal tenderness was present. The rectal and proctoscopic examinations were negative.

On the second day of admission he had gross but painless hematuria which continued for two days and then entirely disappeared. The tourniquet test was negative.

**Laboratory.**—The red blood count was 3,200,000 and the hgb. 56 per cent. The white blood count was 6,800, with 54 per cent polymorphonuclears, 5 per cent metamyelocytes, 38 per cent lymphocytes, 1 per cent monocytes, and 1 per cent eosinophiles. The sedimentation rate was 20. The stools were tarry and contained occult blood (plus 4). The platelets numbered 270,000. The bleeding and clotting time were normal. The non-protein nitrogen was 37 mg. In the gastric contents there was no free HCl, a total acidity of 17, and plus 3 and plus 4 occult blood in all specimens. An intravenous pyelogram was negative. Roentgenographic and fluoroscopic examination revealed the characteristic crater of an ulcer in the duodenum.

The lad was placed on a modified Meulengracht diet. He was asymptomatic during his entire hospital stay, although the stools continued to show plus 4 occult blood until one and one-half months later, when he was started on colloidal aluminum hydroxide every two hours. During this time he had been given five transfusions to offset the anemia accompanying the continual loss of blood. Within a week after starting the colloidal aluminum hydroxide the occult blood in the stools dis-

appeared, and it did not rise above a trace until after discharge from the hospital. At the end of two months roentgenographic examination revealed no evidence of duodenal ulcer. The red blood count was 4,000,000 and the hgb. 84 per cent on discharge.

He had dark stools for several days following discharge, but at the present writing there is no melena. He looks and feels well. Physical examination is completely negative. He is continuing on the prescribed diet with colloidal aluminum hydroxide between meals and at bedtime.

#### COMMENT

Attempts to determine etiological factors were very discouraging. Adult contributory causes such as alcohol, tobacco and emotional strain are almost negligible. Although infection was not a notable feature, nevertheless it is felt that all foci, either active or recently active, should be eradicated. The subject of dietary indiscretion cannot be properly evaluated; children are renowned for dietary imprudence.

It is significant that 6 of the 8 children were definitely under weight. All belonged to families of low income, most of them on relief. This in itself furnishes a good indication that the diets were deficient in certain essential foodstuffs, notably protein. It is estimated by our dietitians that the average relief diet contains about 65 per cent of the optimal protein requirements for a growing child. How much emphasis should be placed on this factor is not known. It has been shown recently that high protein diets can be used with a moderate degree of success in the treatment of peptic ulcer in adults.<sup>4</sup>

In 2 cases there was a significant family history. In Case 2 the father definitely had an ulcer, and in Case 5 the father gave a long history of indigestion, but was not under treatment.

No further stress need be placed on the diversity of symptoms. The single feature in the symptomatology is the duration of the abdominal pain. Individually, the span is from two and one-half months to three years, with a group average of one year. In patients 1, 2 and 3 the pain was so severe they had been sent to the hospital with diagnoses of acute appendicitis. Seven of the 8 localized the pain in the epigastric and paraumbilical region of the abdomen. In Cases 3, 4, 6 and 7, the pain appeared with noticeable regularity during the night and before breakfast in the morning. This would seem to parallel the pain of adults which occurs with greatest frequency after the stomach has emptied, except that in children the interval between food ingestion and the onset of the pain is greatly prolonged. Cases 2, 4 and 6, gave a definite history of relief from food or soda, and,

as might be expected, the two oldest members of the group presented this phenomenon which is so characteristic in the adult. Nausea and vomiting occurred in only 3 cases, but in 2 of these it had occurred on only one occasion each. We feel that it is not important as an aid in the diagnosis of ulcer, but rather tends to confuse the diagnosis with other intra-abdominal conditions, such as appendicitis, for which an unnecessary operation may be performed. This is also true of fever, leukocytosis, and increased sedimentation rate which occurred in 2 cases each. In these instances they were thought to be due to an infection elsewhere that may have been the precipitating factor in re-activating an ulcer already present. Patient 1 narrowly escaped operation on the night of admission because of the history, nausea and vomiting, the fever, and the nature of the abdominal pain.

Loss of appetite was present in only 2 cases, and in Case 1 this amounted to a veritable sitophobia, the abdominal distress and nausea following the ingestion of food. Pyrosis, eructation and flatulence were notably absent in the histories. They may have been present but undisclosed because of the patient's inability to describe the symptom. Although constipation has been reported a common complaint, it occurred in only 2 cases in this group.

Abdominal tenderness was the most constant physical sign. It occurred in 6 cases and was more pronounced in the epigastrium and paraumbilical regions. In 2 patients there was a slight diffuse tenderness elsewhere; in 2 there was no abdominal tenderness at any time.

Anæmia was present in only one case, and this was due to an extensive loss of blood by the bowel previous to and following admission. Occult blood was present in the stools in 4 cases. The test, when done repeatedly, is an aid to diagnosis and a check on the efficacy of treatment. The results of gastric analyses were so inconclusive that they would seem to be of little practical value.

Because of the diversity of subjective and objective findings it is impossible to make more than a presumptive clinical diagnosis of ulcer, so that the burden must fall upon the roentgenologist. In one way this is unfortunate, because in most hospitals there is very little occasion to have gastro-intestinal series in children of this age. The natural conservatism of the roentgenologist makes him very hesitant in committing himself to the presence or absence



of a lesion in children, especially in cases where no crater is demonstrable. This need not be. Our knowledge in this matter has been gained not only by the advice of our roentgenologists but by the roentgenographic and fluoroscopic appearance of the stomach and duodenum in a number of control patients. Peristalsis seems to be normally more rapid in children. Otherwise, there is little essential difference in the roentgenographic appearance in children and adults. I stress this point because in only 3 of our cases were we able to demonstrate an actual crater. The remaining 5 cases were reported as having "a marked irritability and irregularity of the duodenum, suggesting ulceration". Such an interpretation does not necessarily connote that the ulcer is active, but when coupled with suggestive clinical findings we may well assume that it is. Proctor<sup>2</sup> states, "Even among roentgenologists of wide experience few will make a definite diagnosis of ulcer, but the fact that a lesion is present will usually be noted."

Two cases presented definite complications; one (Case 8) with a severe and rather persistent hæmorrhage which was manifest by tarry stools; the other (Case 4) with a moderate degree of stenosis revealed by x-ray but unaccompanied by untoward symptoms. There was retention of the barium meal in 3 cases when first seen. This disappeared with treatment in Cases 6 and 8, but was present in Case 1 following two months of diet alone.

Six patients were placed on a modified Meulengracht diet, and the other two on a bland diet that served the same purpose. In all but cases 7 and 8 the relief from symptoms was almost immediate. Three cases were placed on colloidal aluminum hydroxide; case 8, because of the persistence of duodenal hæmorrhage that did not respond to diet alone; cases 1 and 2, because of subsequent relapses. Patient 2 admittedly would not stay on his diet. Patient 7 has had mild recurrences of abdominal discomfort. Seven of the 8 cases are asymptomatic at the present time. The last roentgenographic examination on this group revealed no evidence of activity in 7 cases.

It is too early to properly evaluate the results of our treatment. As with other illnesses in children, the reparative processes seem to be great.

#### SUMMARY

In the child, as in the adults, the etiological factors of peptic ulcer are questionable. The clinical picture is variable. The one important complaint which should always arouse suspicion is the history of long-standing abdominal pain, recurrent or chronic. The older the child, the greater the tendency for the picture to resemble the adult symptomatology.

The most constant physical sign is abdominal tenderness, although it may be absent at the time of examination. It is usually epigastric or paraumbilical.

The diagnosis must depend upon the roentgenographic examination. Though desirable, the demonstration of a crater is not always possible or necessary. If a constant and characteristic deformity of the duodenum can be demonstrated roentgenographically in a child with sufficient clinical and laboratory evidence of ulceration, then the diagnosis of peptic ulcer is justifiable.

I wish to express appreciation to the Pædiatric Staff of the Vancouver General Hospital for their co-operation and suggestions, and especially to Drs. E. S. James, J. R. Davies, and E. J. Curtis for the use of their cases.

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#### RÉSUMÉ

La littérature médicale ne révèle que 36 cas d'ulcère peptique rapportés chez les enfants. Cet état est probablement plus fréquent. Les circonstances étiologiques sont assez difficiles à établir et l'image clinique est très variable. Il semble que le symptôme le plus fidèle soit la douleur abdominale intermittente et récidivante. Chez le grand enfant les symptômes se rapprochent de plus en plus de ce que l'on observe chez l'adulte. Les malaises abdominaux ont cette caractéristique de siéger, soit à l'épigastre, soit au niveau de la région péri-ombilicale. Le diagnostic précis nous viendra de la radiographie de l'estomac et du duodénum. Les 8 cas rapportés soulignent l'importance de la douleur intermittente et du malaise récidivant.

JEAN SAUCIER



## TUBERCULIN AS A THERAPEUTIC MEASURE IN OPHTHALMOLOGY\*

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THIS paper is really an argument in favour of tuberculin. I am a firm believer in tuberculin therapy in ophthalmology because, first, many cases of eye disease are caused by tuberculous processes; secondly, properly executed tuberculin therapy does a great deal of good and no harm; and, thirdly, if it were not for tuberculin our treatment of these conditions would be very unsatisfactory. That there are tuberculous eye conditions is obvious—there can be no dispute about that. In 1926 Meller, of Vienna, said that tuberculosis is a more important cause of irido-cyclitis than is ordinarily thought. Also in 1926 Verheoff said that anterior nodular scleritis is always due to tuberculosis. Our feeling now is that, whereas tuberculosis is the commonest cause of scleritis, this condition can also be caused by rheumatism and foci of infection. At that time also it was computed that tuberculosis was the cause of 10 per cent of cases of uveitis in the United States, while in Germany it was computed as 50 per cent. The figure likely lies somewhere between these two. Wilmer<sup>1</sup> analyzed a group of cases and computed that 40 per cent of the cases of uveitis are due to tuberculosis. I am not one of those who want to blame tuberculosis always for these conditions. I am only glad if I can find other causes and treat them accordingly.

In relation to our second point that properly executed tuberculin therapy does a great deal of good and no harm, we have the results of clinical experience and the observations of such authorities as Wilmer, Knapp, Gifford and Gay. In Gay's excellent article<sup>2</sup> he gives the results of the treatment of 30 selected cases with seriously diseased eyes. In these the only thing found after extensive investigation was tuberculin hypersensitivity. No patient was made worse, and in the majority the result of the treatment was the restoration of an eye supposedly beyond help. And this last statement serves to illustrate our third reason, namely, that if it were not for tuberculin our treatment of these tuberculous

conditions would be very unsatisfactory. Here were 30 patients who had had everything else done and were given up as beyond help, and they were improved with properly administered tuberculin. And one has only to think of one's own experience with cases of iritis and keratitis, where everything proper was done both locally and generally, which did not do well till tuberculin treatment was instituted. I have given at least 2,000 injections of tuberculin, and I have yet to hear of a case which I have harmed. Two of the opponents of tuberculin therapy, Derby and Carvill, say that the recovery is a result of psychotherapy and improved hygiene. I know that I myself have had cases (I am treating one now) whose hygiene is anything but good, but who have still done well on tuberculin. While I think we should try to improve their hygiene, I believe that these patients can get better without it when they are on tuberculin. And if not tuberculin—what? Will proper hygiene be sufficient? Will foreign proteins? I do not believe so. I must admit at this juncture that I have had no experience with any of the special rays or phototherapy.

## TESTS USED IN THE DIAGNOSIS

I consider the Mantoux test as the best and most informative test. This consists of three intradermal injections of dilute old tuberculin and a control. The dilutions of the tuberculin are No. 5 solution, or 1:100,000, 0.1 c.c. of which contains 0.001 mg. tuberculin; No. 4 solution, or 1:10,000, 0.1 c.c. of which contains 0.01 mg. tuberculin; and No. 3 solution or 1:1,000, 0.1 c.c. of which contains 0.1 mg. tuberculin. These dilutions may be all given at once in a line up the arm, as we did at the Knapp Hospital, or they can be given separately as is done at the Wilmer Institute. Here they give the 1:100,000 dilution and wait 48 hours and then give the next strength if necessary, and then the next. While this is a very safe way it is time-consuming, and I have never seen any harm from giving the injections all at once. Of course if you get a response with the 1:100,000 dilution that is all you need. One-tenth of a c.c. is given

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intradermally, and this also applies to the control which is prepared with phenol the same way, but leaving out the tuberculin. There are occasional cases where you have the whole four injections showing a reaction. This we consider due to the phenol and that the test is of no value. Fortunately these are rare. The patients must report back in 24 and 48 hours, and careful measurements of the area of the reaction made. If the areas are over one cm. in diameter the test is considered positive. It is important not to miss the first day, because sometimes that may show more than the second, and the reverse may be the case. Some say that the Mantoux test should be done on a hospitalized patient but I see no objection to doing it on an ambulatory case. If this test does not give any information and you still feel the lesions are tuberculous the patient may be brought into the hospital and have a subcutaneous tuberculin test done. In this, careful observations of the temperature are taken every two hours for 24 hours, and then a subcutaneous injection of 1 mg. tuberculin (0.1 c.c. No. 2) is given and the same careful observation of the temperature is carried out for 48 hours. In considering the results the chart, local reaction, and focal reaction, if any, are taken into account. A focal reaction may be especially indicative, but this is undesirable, and efforts to produce this with larger doses of tuberculin are to be condemned. If this test shows nothing it may be repeated, using 2 mg., and while some authors advocate going higher I believe this is dangerous practice and that the results are not of as much significance.

In a recent series of experiments with rabbits, Woods, Burky and Friedenwald,<sup>5</sup> at the Wilmer Institute, were able to prove that the cutaneous sensitivity gives a fairly reliable index of the degree of ocular sensitivity in the systemically injected rabbit with undiseased eyes. Also that in rabbits which had had living tubercle bacilli injected into the anterior chamber, there was no relation between the cutaneous sensitivity and the sensitivity of the diseased eye. This would explain, I suppose, why we do not get the positive Mantoux tests that we expect sometimes.

#### CASES IN WHICH THE TESTS ARE MADE

*Tuberculosis of the uveal tract* is the commonest form of ocular tuberculosis. This may be a generalized uveitis, a choroiditis, an iritis, or an iridocyclitis. Every patient with uveitis

should be studied with tuberculosis in mind when the investigation is being made. And when you consider it the proper time, *i.e.*, when other measures have been tried both locally and generally, and there is no contraindication, such as positive chest findings, a systematic course of dilute tuberculin injections should be instituted.

*Sclerosing keratitis* is usually due to tuberculosis. In my experience these cases have only done well when having tuberculin injections. Gifford<sup>6</sup> has watched cases treated with and without tuberculin, and he reports definitely in favour of tuberculin. Disciform keratitis is also often much benefited by tuberculin.

*Scleritis and episcleritis* often show the most dramatic improvement under tuberculin when everything else has been unsatisfactory. My feeling is that we should not long delay starting tuberculin in these cases as they are so frequently caused by tuberculosis. Oftentimes one small injection causes marked improvement.

*Recurrent vitreous and retinal hæmorrhages—Eales' disease.*—These cases usually occur in young males and most often in the left eye. This is due to a tuberculous involvement of the walls of certain of the retinal vessels. In Gay's<sup>7</sup> series of 30 severe cases 5 were in this group, and they were all benefited by tuberculin. Even cases where there was proliferating retinitis were improved. In using tuberculin in this condition a particular effort must be made to avoid a focal reaction, because a focal reaction in which the retina is concerned may do great damage to it. The treatment should be very cautious and prolonged, possibly for one to two years.

*Phlyctenulosis* is mentioned here, because, even though the tuberculous nature is recognized, tuberculin is to be avoided because of the danger of a focal reaction, and because it, unlike most of the other tuberculous eye conditions, responds much more readily to general hygienic measures.

#### ADMINISTRATION OF TUBERCULIN

In commenting on treatment with tuberculin I will confine my remarks to the only preparation I am familiar with, and that is old tuberculin. I will only mention the others. (1) Denys bouillon filtrate is preferred at the Wilmer Institute; (2) B.E. or Bacillen Emulsion; (3) Tuberculin A.O., the Japanese preparation; (4) Tuberculin M.A. 100; (5) Bera-neck's tuberculin; (6) Tebeprotin.

I find the Connaught Laboratory Old Tuberculin very satisfactory both for diagnosis and treatment. At the Knapp Hospital we used the Old Tuberculin prepared by the City Health Department Laboratory. Once tuberculin is diluted it does not keep well. It should be kept in a cool place, and should be prepared at least once a month, although we used to prepare it once a week. It should be injected subcutaneously in the region of the deltoid muscle. The initial dose should be very small, because we do not know anything about the patient's sensitivity. We start with the 1:100,000 dilution, giving 0.2 c.c. While the patient is on this dilution and on 1:10,000 solution or bottles 4 and 5, he should have two injections a week. When he comes back, careful inquiry is made as to what the reaction was last time. If there has been a reaction at all, either local, general or focal, the next dose is not increased. In fact, if there has been a focal reaction the dose should be decreased. However, the possibility is that there has been no reaction, so the dose may be increased to 0.4 c.c. The dose is gradually raised each time until eventually 100 mg. is given, or 1 c.c. of bottle No. 1, or 1/10 dilution. When we reach bottle No. 3, or 1:1,000 dilution, we have them come once a week, and when we reach bottle No. 2 or 1:100 dilution, once in two weeks. When they are on bottle No. 1 we have them come once a month. It may have taken a long time, perhaps a year or more, to reach this strength, but this shows that we can gradually desensitize a person so that he can stand a dose which would ordinarily produce serious effects. Quite often the story is that the patient has cleared up long before this and does not see the necessity for continuing treatment. The patient should be under the observation of the ophthalmologist during his course of treatment. In fact, I believe that the treatment should be administered by the ophthalmologist because, ordinarily speaking, he knows most about it. Malignant exudative forms of tuberculosis should not be treated with tuberculin because of the danger

of a focal reaction. One should use the form of tuberculin with which he is most familiar and not experiment with others.

#### CONCLUSION

In tuberculosis of the eye we are dealing with a special manifestation of the disease in which frank pulmonary tuberculosis is seldom present. I believe that in tuberculin we have a very valuable therapeutic aid provided that it is properly used in the right cases. I do not believe that there is anything to take its place in certain cases, and these should not be deprived of its benefits. The production of focal reactions is to be condemned, as a dose strong enough to cause this, apart from the harm it might do the eye, might light up a focus somewhere else. I do not believe that the ophthalmologist should "pass the buck" to someone else to carry out the treatment, but should do it himself and constantly have the eye under observation. Whereas, ordinarily speaking, it is advised to treat with other methods, such as removal of foci, etc., first, there are some cases, such as scleritis and typical nodular iritis with the slit-lamp, in which you are going to help your patient a lot more by not waiting too long to get started on tuberculin. If one constantly keeps in mind not to increase the dose if there is any kind of reaction, the possibility of producing harm is quite remote.

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## IRIDOCYCLITIS AND SECONDARY GLAUCOMA\*

By P. B. MACFARLANE, B.A., M.B.

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THE co-existence of iridocyclitis and increase in ocular tension forms a very complex problem and one in which one must weigh the danger to the visual function from the two processes. In looking up some articles in the literature I found a good deal of discussion as to whether certain cases were primarily iridocyclitis with a secondary rise in tension, or primarily glaucoma with an iridocyclitis added. It would seem as if the same problem is involved, no matter which condition is primary, as each of the conditions is capable of producing serious damage to the vision.

A glaucoma is said to be secondary when there is some demonstrable condition present in the eye which is the cause of the rise in tension. Elliott, Duke Elder and others make the statement that the more glaucoma is investigated and the more it is understood, the more cases are found to be secondary and the fewer primary. It may even be that in some cases that are thought to be primary there is present a low grade iritis which may be a factor in the causation of the condition.

I would like to describe briefly three cases that I have had in the last year and a half, one of which came out badly, and the other two had a satisfactory result.

## CASE 1

A patient, aged 69, had ordinary double senile cataract. The cataract in the right eye was removed with a good result, a perfectly normal course of healing, no complications, and a perfectly quiet eye. Three months later he reported with the left eye sore. The conjunctiva was inflamed and the cornea cloudy, with many spots on the posterior surface. The iris was muddy, thickened, and spongy in appearance, and had a good deal of exudate on the surface and in the pupillary area. There was, of course, a mature cataract. The tension was increased and with Schiotz tonometer measured 45 mm.

This was quite evidently a case of iridocyclitis with a secondary rise in tension. I first used eserine with no appreciable diminution in the tension and no decrease in the pain. I then used atropine; the pupil dilated only partially, and still the tension was very high and the pain not relieved. During this period he was given soda salicylate and codeine. The only focus of infection we could find was two teeth which were suspicious and were removed as a possible cause, but with no improvement in the eye. Then a paracentesis of the anterior

chamber was done and atropine used. Of course the tension was relieved, but only for one day. The tension became high again and an iridectomy was done and atropine continued. The tension remained low after the iridectomy, but the eyeball became more painful and tender, and was eventually removed because of the pain and the fear of a possible sympathetic ophthalmia.

## CASE 2

This patient, aged 60, was seen five years ago with an attack of iritis for which no cause could be found, but which cleared up rapidly with atropine and soda salicylate, and there was no rise in tension. In February of this year she reported with the eye sore again. On examination the conjunctiva was inflamed, the cornea showed numerous spots on the posterior surface in the typical triangular form, the iris was muddy showing some exudate in the pupillary margin, but the tension was high. The anterior chamber was not shallow.

This patient I immediately sent to hospital and did a paracentesis of the anterior chamber and started atropine. The pupil dilated with difficulty showing some adhesions to the capsule which gradually separated however. In twenty-four hours the tension was up again, the paracentesis wound was opened with a spatula, and the anterior chamber emptied again. In twenty-four hours the tension was up again and the anterior chamber fairly deep; the wound was opened again. The tension remained high, and I repeated this procedure for five days in succession. On the sixth day the tension was normal and has remained so. The K.P. gradually disappeared, the pupil was well dilated, and the eye continued to improve, became white and quiet, with no impairment of vision.

## CASE 3

This was a young man who complained of pain in the eye. The conjunctiva was inflamed, the cornea showed a very few K.P., the anterior chamber was fairly deep, and the iris cloudy, with considerable exudate in the pupillary area which did not appear to be of recent origin. He gave a history of a previous attack of inflammation, which was evidently an iritis as the iris was adherent to the capsule of the lens and never did dilate. The tension was very high. I followed the same line of treatment, did a paracentesis, used atropine and soda salicylate and re-opened the wound every day for five days; on the sixth day the tension was normal. As I said before, the adhesion of the iris never did let go, as the pupil did not dilate, but the adhesion was evidently not complete as there was no iris bombe, and there must have been some circulation of the aqueous. In neither of these latter cases were we able to find a focus of infection as a cause.

These three cases, coming as they did close together, impressed me with the importance of adopting some very definite line of treatment and carrying it out boldly. Elliott says the decision whether to use myotics or mydriatics is so perplexing that some surgeons prefer to put their confidence in the general treatment, rest, purgation, etc., and to use no drops at all, or, as he suggests, try dionine. He recommends, however, that if there are definite signs

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of iritis atropine should be used freely, but the surgeon must be prepared to interfere surgically if the symptoms are not relieved soon, or if there is a considerable rise in the tension. If this occurs he suggests a sclero-corneal trephining, but says that with the iris in its inflamed condition the opening is very likely to become occluded at an early date. Tooke reports some cases in which he persisted in the use of atropine in spite of further rise in tension for ten days or more, and the iritis eventually cleared up and the tension then came back to normal with no damage to the vision. Elliott says "Iridocyclitis accounts for rise in tension by altering the character of the aqueous fluid and thus making it less fit for escape through the meshes of the pectinate ligament, and by furnishing the fluid with cells of inflammatory origin, which tend mechanically to block the open spaces of the filtration area. The angle of the anterior chamber may be completely closed by the contact of the root of the iris with the periphery of the cornea by inflammatory exudate."

In these cases, as in every inflammatory condition, exudation takes place, the production of the aqueous is increased, and it contains a large number of cells, chiefly lymphocytes. Their tendency to conglomeration was additional reason for interference with drainage.

It appears that the increase in tension is definitely associated with the iridocyclitis, the iridocyclitis being the primary factor and the increase in tension secondary. In treating such a hypertension it is necessary to treat the iridocyclitis which is the cause, and for this reason mydriatics appear to be definitely indicated. The first object is to dilate the pupil as much as possible, to remove the congestion from the iris and to rupture the synechiae. On the contrary myotics may have an unfavourable effect on the inflammatory manifestation of the iridocyclitis. They aggravate the congestion of the ciliary body and favour the production of posterior synechiae. By rupturing the posterior synechiae mydriatics permit the free passage of the aqueous, and this largely explains the

favourable effect of atropine on the ocular hypertension. Weekers has never observed an exacerbation of the hypertension in these cases after the use of atropine. He says "The use of atropine in this way causes the pressure to become normal in about half of the cases. When medical treatment is not successful in reducing the tension the visual function will be lost unless the tension is relieved promptly. This can easily be done by simple puncture of the anterior chamber, but its effect is transitory and the puncture must be repeated. Repetition of the puncture has a bad effect on the iritis."

I do not believe that re-opening of the paracentesis wound has any bad effect on the iritis. On the other hand, I believe emptying the anterior chamber and having it fill up with fresh aqueous humour has a beneficial effect, in the same way that in meningitis the removal of the cerebro-spinal fluid with formation of new fluid is beneficial.

Of course, in iridocyclitis one must always endeavour to find the cause, whether it is associated with an increased tension or not. We all know the different causes such as focal infections, syphilis, gonorrhoea, diabetes, tuberculosis, etc. The cause should be searched for and treated, quite apart from the local measures that are undertaken.

How often can a paracentesis be repeated? In one case recently I reopened the wound eighteen times over a period of three weeks. At the end of that time the edges of the corneal wound showed some exudate. Twenty-four hours after each reopening the edges of the wound were united, and on discontinuing this re-opening for a few days the corneal wound closed with no permanent change other than the small scar resulting from the incision.

My conclusion is that in these cases of glaucoma where an iritis is present, one should use atropine, and if on dilatation of the pupil the tension is not lowered promptly, a paracentesis of the anterior chamber should be done. This wound should be reopened repeatedly until by medical treatment and the treatment of any causative condition the iritis has subsided.

## A SURVEY OF THE OPHTHALMIC CONDITIONS AMONG RURAL SCHOOL CHILDREN\*

### II.

BY JOHN V. V. NICHOLLS

*Montreal*

IN October, 1939, a survey was carried out to investigate the incidence of abnormal ophthalmic conditions among rural school children in Pontiac County, P.Q.<sup>1</sup> In May, 1940, another similar survey was carried out in this county and in Wakefield county. Again the pupils were examined without selection. In all some 512 children, 255 male and 257 female, between the ages of 5 and 18 years inclusive, were examined. As in the previous survey the eyes of each child were examined for any abnormalities in the anterior segment, adnexa, and extraocular movements. The visual acuity was recorded for each eye, using Snellen's test types at 20 feet, under proper illumination. Every child showing subnormal visual acuity, abnormalities of the anterior segment, or anomalies of the extraocular movements was examined further under the

action of a cycloplegic. Refractive corrections, when given, were based upon retinoscopy carried out under the action of the cycloplegic.

The results of the present survey, when examined statistically, give some interesting comparisons with those of the previous one. In the table presented are recorded all the ophthalmological disturbances found. The sex and total incidence of each is listed.

Of the ophthalmic conditions found the most important and interesting comparisons are seen with regard to defects of vision. In the present survey 14.6 per cent of the children had subnormal visual acuity as compared with 29.7 per cent in the previous survey. A search for the reasons of this reduction discloses some interesting facts. It is found that the incidence of hypermetropia and hypermetropic astigmatism in the two surveys is almost identical. The same is true of anisometropia, which is another frequent cause of subnormal visual acuity. It is found that the lower incidence of subnormal

\* Conducted under the aegis of the Quebec Division of the Junior Red Cross Society, and with the kind co-operation of the local school boards and medical practitioners.

TABLE I.  
PATIENTS EXAMINED: TOTAL, 512; MALE, 255; FEMALE, 257

Number	Diagnosis	Male		Female		Total	
		Number	Percentage	Number	Percentage	Number	Percentage
1.	Blepharitis sicca.....	3	1.2	4	1.5	7	1.4
2.	Hordeolum.....	1	0.39	0	0	1	0.19
3.	Spastic entropion.....	0	0	1	0.39	1	0.19
4.	Phlyctenular conjunctivitis.....	1	0.39	0	0	1	0.19
5.	Corneal nebula.....	1	0.39	0	0	1	0.19
6.	Dermoid (corneo-scleral).....	1	0.39	0	0	1	0.19
7.	Congenital cataract (stellate).....	2	0.78	0	0	2	0.39
8.	Optic atrophy (primary).....	0	0	1	0.39	1	0.19
9.	Enophthalmos (post-traumatic).....	1	0.39	0	0	1	0.19
10.	Atrophia bulbi (post-inflammatory).....	1	0.39	0	0	1	0.19
11.	Hypermetropia requiring correction.....	4	1.6	1	0.39	5	0.98
12.	Hypermetropic astigmatism.....	11	4.2	11	4.2	22	4.2
13.	Myopia.....	6	2.4	17	6.6	23	4.5
14.	Myopic astigmatism.....	3	1.2	7	2.7	10	1.9
15.	Mixed astigmatism.....	0	0	5	1.9	5	0.98
16.	Anisometropia of marked degree.....	6	2.4	5	1.9	11	2.1
17.	Strabismus, convergent monocular.....	1	0.39	2	0.77	3	0.51
18.	Strabismus, convergent alternating.....	2	0.78	0	0	2	0.39
19.	Strabismus, divergent monocular.....	0	0	1	0.39	1	0.19
20.	Strabismus, divergent alternating.....	0	0	2	0.77	2	0.39
21.	Convergence deficiency.....	0	0	4	1.5	4	0.78
22.	Subnormal visual acuity.....	33	12.5	42	16.3	75	14.6
23.	Subnormal visual acuity, non-correctable..	16	6.3	15	5.9	31	6.1
24.	Patients wearing glasses.....	6	2.4	12	4.7	18	3.5
25.	Glasses worn but unnecessary.....	0	0	4	1.5	4	0.78
26.	Glasses ordered.....	11	4.0	23	8.9	34	6.6

visual acuity in the present survey is due entirely to the smaller number of cases of strabismus and myopia. There is a definite hereditary factor in both these ailments. A larger proportion of the children of the previous survey were related in some degree than in the present series. In the more detailed analysis carried out in the first survey it was found that myopia became less common, the younger the age-group. In the present series a greater proportion of the children belong to the lower age-groups. Apparently something else, statistically less definable, is operating. In the first survey fully one-half of the children examined attended Shawville High School, practically under urban conditions. Whereas, in the present series, much the larger proportion of children attended school under rural conditions. In some places it was found that school closed down during the severe winter months. In other words, the children in the previous survey were under a more continuous and determined educational drive than the children in the present survey. This has taken its toll in myopia.

In the two surveys glasses were prescribed in almost the same percentage of cases. However, fewer children were found already wearing glasses in the present series. In four such cases it was found that the glasses worn were not necessary. As in the last survey, a medical practitioner was not responsible for the mistake in diagnosis in any of these cases.

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## RÉSUMÉ

En 1939 et 1940, 512 enfants des comtés de Pontiac et Wakefield ont subi des examens complets de la fonction visuelle. Ceux du comté de Pontiac ont été revus une seconde fois. Lors du deuxième examen, 14.6 pour cent avaient une acuité visuelle inférieure à la normale alors que les chiffres étaient de 29.7 pour cent au premier examen. Cette différence s'explique par la diminution du strabisme et de la myopie, les autres états étant à peu près les mêmes. Dans la première série, plus d'enfants étaient unis par des liens de parenté que dans la deuxième série. Les enfants examinés en 1940 étaient proportionnellement plus jeunes. En 1939 on retrouvait plutôt des conditions de vie urbaine tandis que celles de 1940 se rapprochaient davantage des conditions rurales. L'étude prolongée paraît augmenter la proportion des myopes. Les verres ont été prescrits également en 1939 et 1940. Quatre enfants les portaient inutilement.

JEAN SAUCIER

## ANÆSTHESIA IN THE PATIENT WITH PULMONARY TUBERCULOSIS\*

By H. E. PUGSLEY AND G. D. RICHARDSON

*Gravenhurst, Ont.*

**PATIENTS** with active pulmonary tuberculosis usually tolerate anæsthesia and operation very well. However, a small percentage develop a post-operative spread of the tuberculous disease in their lungs. This extension of the pulmonary lesion is the principal cause of post-operative deaths and it is the purpose of the present paper to indicate the causes of and measures which will aid in the prevention of this serious complication. Overholt<sup>1</sup> reported a mortality within three months of thoracoplasty of 2.2 per cent in a large group of patients under forty years of age, and a mortality of 6 per cent in a group over forty years of age. In both groups, the principal cause of death was an extension of the tuberculous process within the lung.

We believe that surgical shock results in a

lowered resistance to the tuberculous infection and is one of the primary causes of a spread in the lung. Therefore, every effort should be made to avoid the development of shock by careful pre-operative preparation, multiple stage operations where feasible, routine intravenous saline during major surgery, and blood transfusion if signs of shock appear.

## THE SELECTION OF THE ANÆSTHETIC

Local anæsthesia is selected for most minor operations, such as the insertion of an intercostal catheter or intrapleural pneumolysis. For such minor procedures as the opening of an ischio-rectal abscess we have found pentothal sodium given intravenously very satisfactory. This agent causes no pulmonary irritation or stress, the patient emerges from the anæsthetic quickly, and is rarely nauseated afterwards.

For major operations below the level of the diaphragm spinal anæsthesia is usually selected. For short operations we use procain and for

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those of longer duration, nupercain. These agents provide satisfactory analgesia, respirations are quiet, and the cough reflex is not abolished.

For major thoracic operations, such as thoracoplasty and extrapleural pneumolysis, we prefer cyclopropane anaesthesia. Alexander,<sup>2</sup> in discussing the selection of the anaesthetic agent for thoracoplasties, states, "There is no available evidence to show that a properly administered gas anaesthetic is responsible for a higher percentage of post-operative complications than is local anaesthesia and, in fact, it is probably responsible for a lower percentage, whether the patient's sputum be little or great in amount." Dunlop<sup>3</sup> states that inhalation agents "remain the most generally useful in major thoracic surgery" and that "by all odds, the most popular inhalation agent now in use is cyclopropane". Shields<sup>4</sup> also selects this gas for thoracoplasties. The many advantages of cyclopropane with its high oxygen content, quiet respiration, quick

action, and only slight irritation of the respiratory membrane, are well known.

THE PRE-OPERATIVE PREPARATION OF THE PATIENT

Patients with pulmonary tuberculosis in the acute exudative phase should, if possible, have a long period of bed rest until the lesion is in a more chronic fibrotic phase before being subjected to a major operation. It is known that a post-operative spread of the tuberculous process in the lung occurs much more frequently in the former than in the latter stage. Patients should be encouraged to "empty the lungs" of all available secretions by coughing and postural drainage during the few hours preceding operation. Those with profuse expectoration should not be operated on early in the morning before they have had ample time to clear their lungs of secretions.

Liberal quantities of fluids and glucose should be given during the twenty-four hours preceding operation. An intravenous infusion of normal saline is a routine measure before all major

TABLE I.  
MUSKOKA HOSPITAL  
ANALYSIS OF ANÆSTHETICS FOR 147 MAJOR OPERATIONS ON 82 PATIENTS WITH PULMONARY TUBERCULOSIS

Anæsthetic	Number of operations	Surgical shock	Post-operative spread in the lung within 3 months	Post-operative deaths within 3 months
Cyclopropane	127 (118 major chest operations.)	13	5 (All followed major chest operations and 3 of the 5 had surgical shock.)	3 Tuberculous pneumonia... 1 Influenza pneumonia..... 1 Tuberculous cellulitis..... 1
Spinal	20	0	2 (One was a terminal case.)	2 Terminal tuberculosis..... 1 Streptococcal peritonitis... 1
Totals.....	147	13	7 Excluding the terminal case; Operation incidence 4.1% Case incidence..... 7.3%	5 Excluding the terminal case; Operation mortality... 2.7% Patient mortality..... 4.9%

NOTE.—71 per cent of the above patients had sputum positive for tubercle bacilli at the time of operation.

TABLE II.  
MUSKOKA HOSPITAL  
ANALYSIS OF ANÆSTHETICS FOR 75 MINOR OPERATIONS ON 35 PATIENTS WITH PULMONARY TUBERCULOSIS

Anæsthetic	Number of operations	Surgical shock	Post-operative spread in the lung within 3 months	Post-operative deaths within 3 months
Cyclopropane	18	0	0	0
Spinal	12	0	0	0
Nitrous oxide	6	0	0	0
Intravenous pentothal or evipal	39	0	1 Terminal tuberculosis	1 Terminal tuberculosis
Totals.....	75	0	1	1

NOTE.—33 per cent of the above patients had sputum positive for tubercle bacilli at the time of operation.



surgery, and is continued during and after the operation until the patient has received about three litres of fluid. This measure tends to eliminate shock and may be a factor in the reduction in the incidence of atelectasis by preventing the pulmonary secretions from becoming too viscid.

A sedative such as pentobarbital sodium is prescribed on the night preceding operation. One hour before operation, pantopon, gr. 1/3 with hyoscine gr. 1/150 is given by hypodermic, followed in fifteen minutes by pentobarbital sodium, gr. 1½ to a man of average size; women receive slightly smaller doses. The patient usually arrives in the operating theatre either asleep or free from apprehension.

Before major surgery the patient's blood should be typed with that of a prospective donor in order that a blood transfusion may be given immediately following operation should signs of shock appear. In addition, a blood transfusion is indicated for patients with a hæmoglobin of less than 70 per cent.

#### OPERATIVE COMPLICATIONS DURING MAJOR CHEST SURGERY

During major chest surgery there are certain operative complications worthy of note, and measures which will aid in their prevention or control are indicated below.

Troublesome reflexes such as breath-holding or laryngospasm are prone to develop when the periosteum is being stripped off the rib or the parietal pleura from the chest wall in a patient too lightly anaesthetized. This breath-holding or stridor causes anoxæmia, rapid pulse rate, increased venous pressure, and may contribute to the development of shock. To avoid these reflexes cyclopropane anaesthesia is induced at least ten minutes before the surgeon begins to operate and is deepened to about the second plane of the third stage. When the surgeon commences to close the muscle layer the anaesthetic is lightened by the addition of air or a helium-oxygen mixture. If the above technique is followed intubation for thoracoplasty becomes necessary in only a small percentage of cases, chiefly those requiring tracheal aspiration because of profuse pulmonary secretions.

Paradoxical respiration commonly occurs and may become quite marked during the operation of extrapleural pneumolysis and less so during a thoracoplasty. Occasionally an accidental pneumothorax will develop during the former opera-

tion; rarely, during the latter. Both complications are aggravated by a partial obstruction of the airway and, therefore, the endotracheal catheter technique is recommended as a routine for extrapleural pneumolysis; this technique also ensures that the patient will not have expiratory stridor, which causes the lung to balloon out into the surgeon's field of operation during the stripping of the parietal pleura off the chest wall. Rhythmic pressure on the breathing bag may be necessary to relieve anoxæmia as a result of paradoxical respiration in a patient with limited respiratory reserve.

Obstruction of the airway by pulmonary hæmorrhage or excessive secretions is a rare complication. Nevertheless, facilities for tracheal aspiration through a catheter or bronchoscopic aspiration should be immediately available.

The importance of avoiding surgical shock as well as measures of prevention and treatment have been stated. The anaesthetist should be alert for early signs of shock such as falling blood pressure and increasing pulse rate. When these appear the surgeon is at once notified so that he may consider immediate closure and completion of the operation at a later stage.

#### POST-OPERATIVE COMPLICATIONS

The complication responsible for most post-operative deaths in this group of patients is an extension of the tuberculous process in the lung, either as a bronchogenic spread due to aspiration of infected secretions or as an acute exacerbation of a pre-existing focus in the lung. To reduce the incidence of this serious complication to a minimum, patients whose pulmonary lesion is in an acute exudative phase should, if possible, have major surgery postponed until rest treatment has resulted in the body temperature returning to normal or nearly normal and the x-ray shows evidence of fibrosis or "hardening" of the lesion. Other factors in its prevention are a strict observance of the measures of pre-operative preparation and the avoidance of surgical shock.

During the few days immediately following a thoracoplasty in which too many rib segments have been removed paradoxical respiratory movements of the weakened chest wall may lead to increasing exhaustion and a terminal tuberculous pneumonia. By limiting each stage of the operation to the removal of about three ribs this complication is rarely seen.



Patients with tuberculous empyema and a broncho-pleural fistula form a very hazardous group because of the high incidence of a bronchogenic spread of the tuberculous process following operation. All patients with tuberculous empyema should have a thorough aspiration and washing out of the pleural cavity shortly before operation, because an intermittent broncho-pleural communication may be present in the absence of any clear clinical indication of such. If a secondary infection is present in the empyema sac pre-operative intercostal drainage and irrigation is indicated.

Atelectasis of a lobe or whole lung may de-

causation of post-operative spread of the pulmonary lesion.

Figs. 1 to 4 illustrate certain points mentioned in the text.

### CONCLUSIONS

1. The most frequent serious post-operative complication in this group of cases is an extension of the tuberculous process in the lung.
2. The cause of and measures which tend to reduce the incidence of the above complication have been indicated.
3. Shocked patients run an increased risk of spread of the pulmonary lesion.

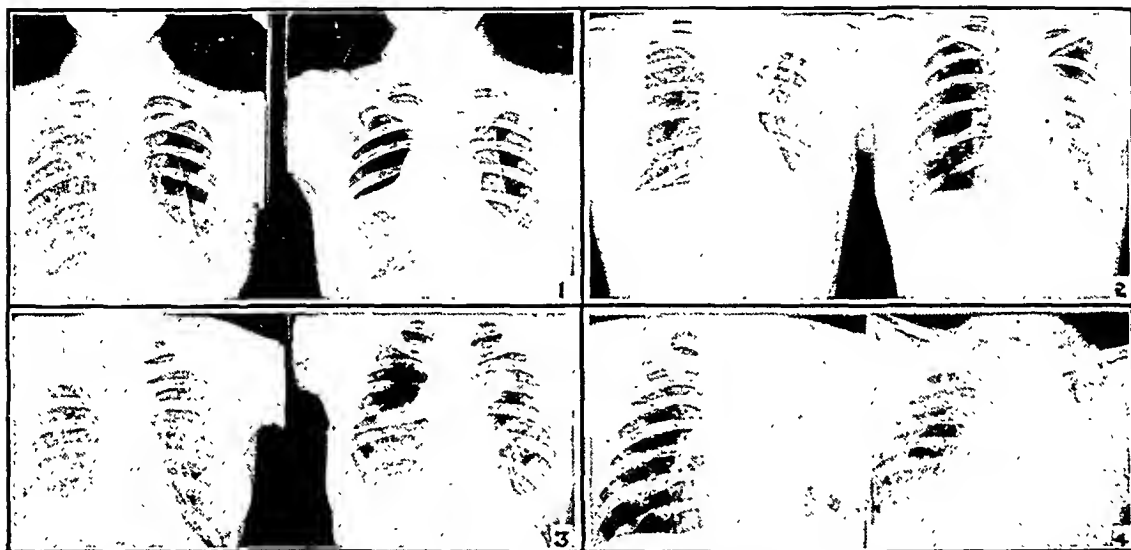


Fig. 1.—This illustrates the chest x-rays before and after extrapleural pneumonolysis on the right side done in the presence of artificial pneumothorax on the left. The endotracheal catheter technique is recommended as a routine for this operation. Fig. 2.—This is a case of a bronchogenic spread to the left lower lobe following an extrapleural pneumonolysis performed under local anaesthesia. We believe that the danger of a spread is just as great following major surgery done under local anaesthesia as it is under general anaesthesia with cyclopropane. Fig. 3.—An example of an acute flare-up of a focus in the left lung following an operation in which the patient developed surgical shock. Fig. 4.—This demonstrates a tuberculous bronchopneumonia in the right lung a few days after the first stage of a thoracoplasty on the left side in a patient with tuberculous empyema and a broncho-pleural fistula. The patient died on the seventh day and the above diagnosis was verified at autopsy.

velop if a plug of mucus becomes lodged in a bronchus, although this is not a common complication. A liberal intake of fluids probably aids in its prevention by keeping pulmonary secretions from becoming too viscid. When atelectasis develops, however, bronchoscopic aspiration of a mucous plug should be attempted.

Table I and II are an analysis of anaesthetics for 147 major operations and 75 minor operations at the Muskoka Hospital. It is noteworthy that no complications followed the minor operations except in one case of terminal tuberculosis. This may be taken as evidence that surgical shock and trauma are important factors in the

4. Patients whose pulmonary disease is in the chronic fibrotic phase usually tolerate anaesthesia and operation very well. Those with a lesion in the acute exudative phase are much more prone to develop a post-operative spread.

The authors wish to express their indebtedness to Dr. H. J. Shields, Toronto, for his advice in the preparation of the above paper.

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## A CLINICAL STUDY OF THE INFERIOR TURBINATE CAVERNOUS TISSUE; ITS DIVISIONS AND THEIR SIGNIFICANCE\*

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*Toronto*

THE cavernous tissue blood vessels of the lateral nasal wall have been regarded as a sheet of connecting vessels which may contract as a whole or in part in an unrelated and erratic manner. Anatomical investigation of the cavernous tissue of the lateral nasal wall has brought to light that the blood flows into a system of underlying vessels which in turn traverse bony canals in the turbinate. These vessels follow such definite courses as to suggest that certain blocks of cavernous tissue might react as units physiologically. The experiments which are described in this paper show that the cavernous-tissue vessels of the inferior turbinate act together in certain definite tracts or pathways which correspond with those noted in the anatomical work. Some clinical conclusions are drawn with regard to the part played by this mechanism in producing hypertrophy. The effect of cavernous-tissue reactions on the maxillary antrum circulation is indicated and the inadvisability of removing the anterior tip of the inferior turbinate. Reference is also made to the fallacy of certain commonly used physiological measurements of cavernous tissue reactions.

There is little to be found in the literature on this subject. So far as the writer is aware, no other anatomical work has brought out these interesting pathways and no physiological investigation has been undertaken regarding the vessels of the lateral nasal wall with this end in view.

### ANATOMY

The anatomy of the inferior turbinate venous channels has already been dealt with at considerable length in a previous communication. The accompanying diagrams indicate the different tracts or pathways dealt with in the following experiments.

We have found that the cavernous tissue of the inferior turbinate can be divided into three

main areas or pathways which will be called A, B, and C. "A" is subdivided into four areas and "B" into two (Fig. 1).

Area "A" comprises the anterior 2/5ths of the inferior turbinate and the atrium area. The anterior 2/5ths of the inferior turbinate division measures about 2 cm. in length. Area "B" occupies the middle 1/5th of the inferior turbinate and Area "C", the posterior 2/5ths of the turbinate.

These three pathways correspond to certain vascular areas fairly well defined anatomically. In Area "A" the turbinate arteries have left their bony canals and the main branches lie in the periosteum only. The cavernous tissue is thick over this area.

Area "B" contains the anterior part of the bony canals of the inferior turbinate (Fig. 2B) and at the junction of areas "A" and "B" the arteries emerge from their bony canal orifices. The layer of cavernous tissue is thinner than in Area "A".

Lastly, Area "C" takes in the posterior 2/5ths of the inferior turbinate and includes the posterior tip. The cavernous tissue in this latter area is capable of marked dilatation and contraction (Figs. 2C and 2D).

Subdivisions of Areas "A", "B", and "C".

A1 is the name which we have given to a circular area of cavernous tissue at the extreme anterior tip of the inferior turbinate and close to the skin margin. It is about 1 cm. in diameter and lies anterior to the pyriform aperture. It is lying, therefore, on soft tissue and connects with the veins of both turbinate and face.

A2 is located between A1 and B1 and lies along the medial surface of the turbinate (Fig. 2A).

A3 comprises the atrium area.

A4 is the area of cavernous tissue along the inferior border of the turbinate between A1 and B2 areas, meeting the latter (B2) at a canal orifice through which passes the artery to the inferior border of the turbinate in its anterior 2/5ths.

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From the Department of Otolaryngology, University of Toronto, and Toronto General Hospital.

Area "B" is made up of two parts.

B1 is the area occupying the medial surface of the middle 1/5th of the turbinate (Fig. 2B).

B2 is located along the inferior border of the turbinate in this same area.

Area "C" is found posterior to Area "B", including the cavernous tissue of the posterior part of the turbinate which hangs down in a somewhat pendulous manner when fully dilated. It is this appearance which is used to illustrate the posterior tip of the inferior turbinate in most anatomical illustrations (Figs. 2C and 2D).

#### METHOD

The experiments have been of such a simple and non-injurious nature that human material has been used.

A small cotton applicator is dipped in a 3 per cent aqueous solution of ephedrine and lightly applied to the surface of the turbinate on a very small part of the pathway to be tested. It should not cover more than about 1 mm. This means that about 1 min. of the drug is actually acting on the area. The colour and size of the superficial vessels can then be observed through a 10 dioptre lens held close to the nasal speculum.

Of three factors which influence movement of blood in veins, namely, *vis a tergo*, gravity, and extrinsic muscle, two have been controlled by making them either a constant factor or by noting the change in capillary colour. Extrinsic muscle is, of course, not found in the mucous membrane of the nasal cavity or sinuses,

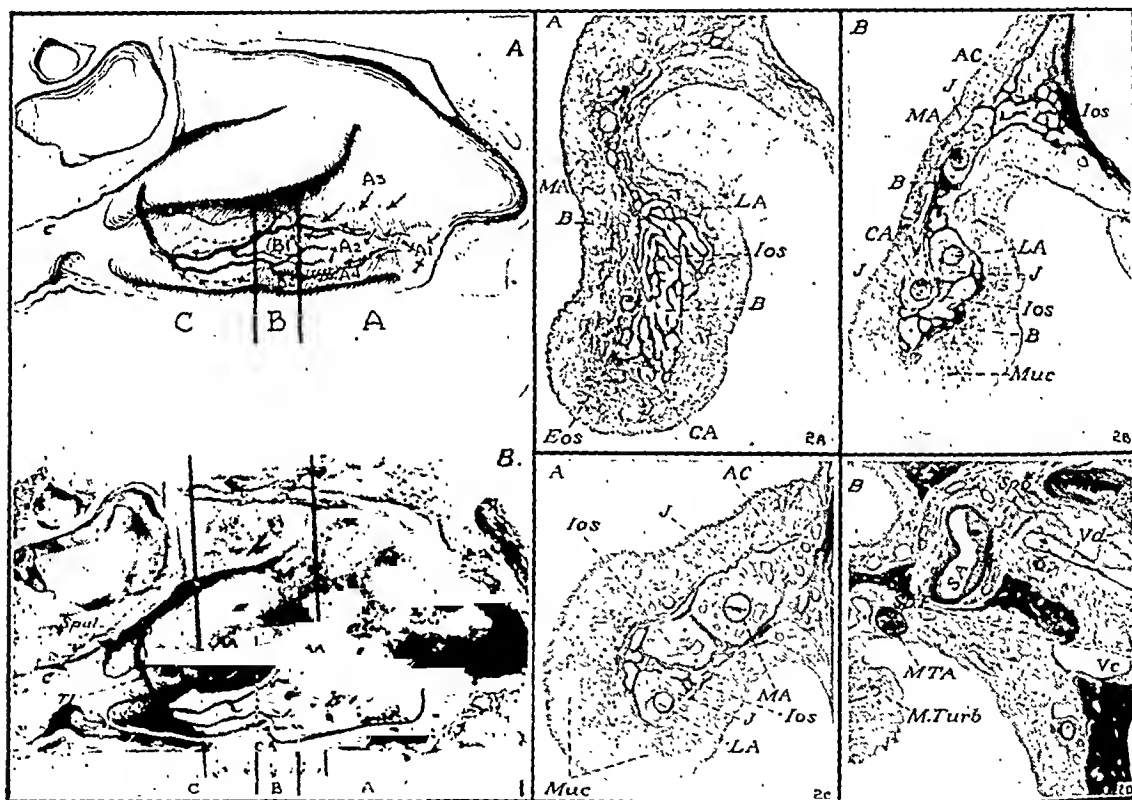


Fig. 1A.—This diagram, traced from the photograph of the lateral nasal wall below, shows the cavernous tissue divisions A, B, C and the subdivisions. The arrows indicate the direction of venous blood flow. The point of some arrows is blunted, indicating that blood is also flowing into tiny bony canals in addition to the main flow. Fig. 1B.—The white patch over the inferior turbinate indicates the area of the large bony canals for transmission of the large turbinate vessels. The cross sections of the turbinates in Figs. 2A, 2B, 2C and 2D were taken from this specimen. Fig. 2A.—(Mag. 7X.) Cross section through division A, i.e., anterior half of inferior turbinate, showing the "intraosseous" canals and veins within them. The medial and lateral branches of the inferior turbinate artery are lying on the surface of the bone. A plexus of periosteal veins is seen about them. Some connections of erectile tissue with "intraosseous" veins can also be seen. Fig. 2B.—(Mag. 7X.) Cross section through division B, i.e., inferior turbinate in its central one-fifth. The arteries noted in Fig. 2A are now in canals. Figs. 2C and 2D.—(Mag. 7X.) Cross section through division C of the inferior turbinate. The "canal for the antrum vessels" communicates with the superior canal.

Lettering: A.C., canal for antral vessels; Muc., mucoperiosteum; Ma., medial branch; La., lateral branch; J., a periosteal "jacket plexus" within a canal; B., bone; Ios., "intraosseous" veins and canals; Ca., communicating branch joining medial and lateral arteries; Eos., a connection between erectile tissue and an "intraosseous" vein. (Republished with permission from the *J. of Laryngol. & Otol.*, 1935, 50: 569.)

a fact which Zuckerkandl stated in his very valuable paper of fifty years ago.

The patient is seated in the chair as for an ordinary rhinological examination. The head is kept still, thus eliminating the gravity factor as a cause of variation of the blood flow in the vessel reactions. The reaction of the cavernous tissue has been judged by the thinning or swelling of the mucosa, and the colour and dilatation of the surface capillaries has indicated any increase in arterial blood flow.

Anterior rhinoscopy has been carried out, noting the thickness of the inferior turbinate mucosa and relating it to other parts of the nasal cavity, to prevent any misconception of reactions which might take place. In every case it was found necessary to note whether or not shrinking took place after introduction of the nasal speculum. Not infrequently, within a few seconds of the introduction of the speculum, an inferior turbinate would be seen to shrink appreciably. Presumably this was due to the stimulating effect of the inspiratory current of air striking the surface of the mucosa more directly than with undilated nasal vestibule.

If a cotton applicator was to be used in applying the drug to the mucosa, the "pressure stimulus" was noted. This test consisted in touching the mucosa with a pressure equal to that which would be used in applying the drug. The reaction of the mucosa as regards colour and shrinking was then noted. By this means a fairly accurate idea was gained of the action of the drug itself. The best drug for stimulating the pathways to activity was found to be a 3 per cent aqueous solution of ephedrine. It allowed the blood to flow through the capillaries with little or no interruption. It caused contraction of the cavernous tissue, and there was seldom evidence of arterial dilatation. This latter statement has already been discussed in a former paper<sup>2</sup> and further work is being undertaken along these lines as opportunity offers.

Considerable time was spent in observing the "pathway" reactions. For a satisfactory test the turbinate must be reasonably swollen, otherwise the shrinking could not be noted with certainty. In other cases the turbinate was so hidden in whole or in part that again the reaction could not be seen well enough to give conclusive evidence. The experiments described below presented the necessary reactions clearly

enough to be used as proof of the venous pathway reactions.

Posterior rhinoscopy was employed when necessary to observe the posterior tip of the inferior turbinate and to note any shrinking reaction.

### EXPERIMENTS

A number of experiments have been carried out with the object of stimulating the various pathways of the inferior turbinate alternately and systematically in order to estimate by this means the effect of one upon the other. Owing to the difficulties of stimulating the posterior half of the inferior turbinate with ephedrine without also depositing the drug on the other pathways in the process it has taken time and patience to finally procure the ideal cases in which all these sources of error could positively be eliminated. A few typical cases have been chosen to illustrate the reactions.

*Experiment 1.*—Miss Q. On nasopharyngeal examination the posterior tips of both inferior turbinates were clearly seen. They were pale and presented the slightly mulberry appearance usually associated with hypertrophy. After shrinking down in the course of the experiment the right posterior tip showed no hypertrophy and the left shrank sufficiently to indicate a definite posterior tip reaction.

On dilating the vestibule with the nasal speculum, the anterior half of both right and left inferior turbinates in turn shrank slightly. After withdrawing the speculum and then re-introducing it the turbinate was found to have assumed its original thickness in the interval, but almost immediately shrank as before. This "speculum reaction", as I have called it, was therefore taken into consideration when drug reactions were noted.

3.12 p.m.—Ephedrine (3 per cent aqueous solution) applied to A1 area of right inferior turbinate.

3.13.—Shrinking has occurred over A1 area of turbinate.

3.15.—Shrinking has spread posteriorly along A2, and the anterior edge of division "B" is defined as a definite ridge.

3.19.—The inferior border of the turbinate, A4, has shrunken slightly, but to a much less degree than A2. This shrinking has now apparently ceased.

3.21.—Ephedrine is now applied to the inferior border of the turbinate, i.e., A4.

3.22.—A4 is now markedly shrunken, i.e., as far as the B2 area.

3.25.—Ephedrine applied to B2 area.

3.26.—B2 area is markedly shrunken.

Summary.—(1) Areas A1 and A2 have reacted together, shrinking in an antero-posterior direction and including area A4, i.e., the anterior half of the inferior border, to a very minor degree. (2) The A4 area required a separate application of the drug to bring about a similar degree of reaction. (3) Area B2 required a separate application of ephedrine to bring about shrinking.

Conclusions.—(1) Areas A1 and A2 have responded together. (2) A4, i.e., the anterior half of the inferior border, has reacted as a unit or separate pathway. (3) B2, i.e., the inferior border of the "B" area has reacted as a unit or tract.

Remarks.—The combined reaction of A1 and A2 is not uncommon, although A1 area has frequently been observed to shrink without any effect on A2 (see Experiment 2).

*Experiment 2.*—Miss Q. (same case, next day). Posterior tips of inferior turbinate examined as in Experiment 1, and a similar condition found today. Similar preliminary tests were also carried out.

3.17.—Ephedrine is applied to A1 area of left inferior turbinate.

3.20.—A1 area of turbinate is shrunken. A2 is unaffected. On nasopharyngeal examination, no difference noted in posterior tip of turbinate.

3.23.—Ephedrine applied to A2 area of left inferior turbinate.

3.24.—A2 is shrinking slowly.

3.25.—Ephedrine applied again to A2.

3.28.—A2 is now markedly shrunken. Posterior tip of inferior turbinate is unaffected.

3.30.—The anterior border of the B1 area now stands out distinctly and A1 and A2 areas are flat. There is no change in posterior tip of left inferior turbinate.

3.35.—B1 area is slightly thinner. A4 area, i.e., the anterior half of the inferior turbinate border is slightly thinner. B2 is unaffected. Posterior tip of turbinate is unaffected.

3.42.—Ephedrine applied to B1 area.

3.44.—Ephedrine again applied to B1 area.

3.45.—B1, i.e., medial surface of "B" area, is shrinking.

3.49.—The posterior tip of the inferior turbinate is now appreciably shrunken for the first time.

Summary.—(1) A1 area reacted by itself and had no appreciable influence on A2. (2) A2 reacted by itself and had no appreciable influence on either "B" area or the posterior tip. (3) B1 area reaction included the posterior tip of the inferior turbinate.

Conclusion.—(1) The tracts of the inferior turbinate require separate stimulation to produce the full effect of the drug. (2) The tracts may react separately. (3) The shrinking of area "A" did not induce shrinking of the posterior tip of the turbinate.

Remarks.—The inferior border of the turbinate in this case may have been directly affected by excess of the drug. The inferior border is, as a rule, but little affected by the reaction of A2 and A1 tracts.

*Experiment 3A.*—M.S. This case was a particularly suitable one for these pathway tests owing to a very large septal perforation which made it possible to obtain a lateral view of the medial surface of the inferior turbinate in the "B" area on looking through the septal perforation. The posterior tip could also be partly made out. The usual preliminary tests were carried out.

2.35.—Ephedrine is dropped on the right inferior turbinate posterior to the "B" area. This is easily accomplished by passing the dropper through the septal perforation, thus avoiding any disturbance of the turbinate anterior to this.

2.36.—A2 is definitely shrinking.

2.39.—Ephedrine dropped over "B" area and posterior to it.

2.40.—The mucosa of the "B" area is slightly thinner.

Note.—The speculum stimulus is present, although lost for a few minutes after the posterior tip was shrunken. However, following the application of the drug to the "B" area, A2 has become markedly shrunken and the speculum stimulus is lost.

2.44.—The "B" area is now much thinner.

2.49.—The A2 is still markedly shrunken.

Summary.—(1) Application of ephedrine to the posterior tip caused marked shrinking of A2 area. (2) The posterior tip had practically no effect on the "B" area, although A2 was definitely affected. (3) Shrinking of "B" area with direct application of ephedrine caused a much more marked thinning of A2 than when the posterior tip alone was stimulated.

Conclusions.—Application of ephedrine to the posterior tip of the inferior turbinate affects A2 area of the inferior turbinate cavernous tissue pathways to a very definite degree. "B" area was but little affected in this experiment. Stimulation of the "B" area with ephedrine causes marked constriction of A2 area although the reverse does not apply.

*Experiment 3B.*—M.S. (the same patient). The left inferior turbinate was tested as described in experiments 1 and 2, with similar results.

*Experiment 4.*—Mrs. T. The posterior tips of the inferior turbinates could not be as clearly seen in this case, but during the experiment the effect of a post-nasal application of ephedrine, i.e., to posterior turbinate tips on the areas A2 and A1, was definitely noted.

2.38.—A postnasal application of ephedrine is made by the nasopharynx.

2.40.—Areas A2 and A1 of the right inferior turbinate are definitely shrunken more than was the case from the speculum stimulus alone and the shrinking is quicker. After removal of the speculum the turbinate again swells but again responds as before on the introduction of the speculum.

The patient's nose and front part of her head feel "clearer" since the nasopharyngeal application.

*Experiment 5.*—Mrs. T. The usual tests of pressure and speculum reflex were carried out.

2.10.—Ephedrine applied to A4, i.e., the inferior border of the left inferior turbinate close to its anterior extremity.

2.15.—A4 area, i.e., the inferior border, is shrunken back as far as the B2 area. The A1 tract is unaffected. The A2 tract is shrunken in this case.

2.18.—Ephedrine applied to the anterior part of B2, i.e., inferior border of "B" area.

2.19.—This part of the inferior border of the "B" area is shrunken. The inferior border of the turbinate posterior to B2 is still unaffected.

2.32.—Ephedrine is applied to A1 area, which shrinks.

2.35.—Ephedrine applied to A3, i.e., the atrium area, which has been unaffected so far. It shrinks.

Summary.—(1) A4, i.e., the anterior half of the inferior border of the turbinate, shrinks, affecting A2 area. (2) B2 area, i.e., inferior border of turbinate, shrinks alone. (3) A3, i.e., atrium area, in this case shrinks only after a direct application to it.

Conclusions.—(1) A4, i.e., anterior part of inferior border of turbinate, shrinks as a tract but in this case the reaction also includes the A2 area. (2) The A1 area reacts as a separate tract. (3) A3, i.e., the atrium area, reacts as a separate tract in this case.

## SUMMARY

1. The cavernous tissue of the inferior turbinate is composed of definite pathways or tracts which may react separately or synchronously. They correspond to the anatomical distribution of the cavernous tissue pathways. The periosteal veins are concentrated about the larger arterial branches to a great extent. The large arterial branches therefore indicate in a general way the location of those veins into which passes the blood from the cavernous tissue pathways A, B, and C.

2. The cavernous tissue tracts do not contract systematically in an antero-posterior direction, but the C pathway after ephedrine stimulation causes a shrinking of area A. As a rule, the block of cavernous tissue forming B area is little affected by ephedrine applied anterior to it, and, conversely, ephedrine applied to the posterior tip may affect A2 and A1 areas with no apparent effect on the cavernous tissue of B area. These reactions suggest that the stimulus is in the

nature of a vasomotor one, acting through the vessels in the bony canals.

#### CLINICAL CONSIDERATIONS

The clinical application of the foregoing physiological reactions is of interest.

A posterior turbinate tip application will have a marked effect on the cavernous tissue in area A, but area B may be little or not at all affected. The reverse, however, is not true, *i.e.*, under normal conditions of strain on area A, according to the foregoing experiment. External stimuli such as the inspiratory air current, etc., do not necessarily affect all the pathways of the inferior turbinate system equally or synchronously. For example, A1 area may be affected alone or A1 and A2 together. A3 may or may not be included in the reaction. Area B often gives no evidence whatever of a reaction when A1 and A2 tracts shrink.

It will be understood from this illustration how inaccurate may be the results of physiological experiments if the contraction or swelling of the nasal cavernous tissue is estimated by a measurement of the variation in the total air volume in a nasal cavity and no careful inspection of the nasal turbinates is carried out.

Hypertrophies of the mucous membrane commonly occur at areas of greatest strain on these cavernous tissue tracts. (a) A1 is the most exposed of all the tracts. (b) A4 is often involved, being at the most dependent part of the turbinate and with the added factor of suddenly restricted blood flow into the bony canals of area B2. (c) A localized hypertrophy is often found at the junction of A4 and B2, where a large bony canal orifice is found. (d) The posterior tip hypertrophy requires a little more detailed explanation.

We have shown the marked shrinking effect produced on area A by contraction of area C. This suggests that a very powerful shrinking effect is exerted on the cavernous tissue of area A by that of C. It may be considered in the nature of a reserve power which can be exerted on area A. It is a force to be called into action when area A is hard pressed or fatigued. Hypertrophies of the posterior tip therefore may indicate overstrain of cavernous tissue in area A

and probably a more direct and potent cause of this hypertrophy than the irritation resulting from nasal discharge over the surface of the posterior tip.

Some of us have observed on numerous occasions that cavernous tissue of the posterior tip may be so contracted that the mucosa is almost as thin and pale in appearance as that of a normal sinus. At the same time areas A and B will present the normal thickness and pinkish-red appearance of a normal turbinate. It is evident that the normal circulation and reactions of Areas A and B can be carried on without any appreciable influence on the posterior tip. It is concluded, therefore, that the posterior tip influence on areas A and B is not called into action under average conditions but only when the latter are under extra strain.

The foregoing has brought out the influence of area C on area A through the bony canal route. A similar canal for transmission of veins from the *maxillary antrum* is found in the posterior 2/5ths of the turbinate in close communication with those from area A of the turbinate (Figs. 2C and 2D). We therefore conclude that the cavernous tissue of area C can exert a powerful constriction on the plexus of veins on the medial wall of the antrum.

Removal of the anterior tip of the inferior turbinate surgically has not infrequently been observed to produce much discomfort to the patient subsequently. A watering of the nose is one of the most annoying symptoms. We can now understand how such a careless removal of the cavernous tissue in this area interrupts the smooth co-ordination of one pathway with the other, and how a shutting-off of the outflow of blood through turbinate channels has left sensitive cavernous tissue exposed to external atmosphere without sufficient reserve to withstand these demands.

My thanks are due to Dr. Duncan Graham, Professor of Medicine, for the co-operation of his Department in this work.

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## OSTEITIS DEFORMANS (PAGET'S DISEASE)

BY M. SIEGEL

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OSTEITIS deformans was first described by Sir James Paget in 1876 as a "rare and strange malady of bones". Since that time many cases of osteitis deformans have been recorded in the literature, yet the condition still belongs to the rare diseases.

Carman and Carriek have found 15 cases in 237,000 admissions to the Mayo Clinic in six years. F. C. Newton<sup>6</sup> has found 17 cases of osteitis deformans in 40,000 admissions to Peter Bent Brigham hospital in ten years. Sugarbaker<sup>7</sup> has found 51 cases of Paget's disease in a total of 222,676 admissions to the Henry Ford Hospital from 1922 to 1937. Calculations from various institutions show the ratio of Paget's disease to all admissions to be from 1:3,000 to 1:16,000. The mono-osteitic type is still rarer, comprising only a very small percentage of all reported. Hurwitz<sup>2</sup> has found that up to the year 1908 there have been only 5 or 6 cases of mono-osteitic type reported in literature in which pathological or x-ray findings have confirmed the clinical diagnosis. Gutman and Kasabach,<sup>1</sup> in an analysis of 116 cases, have found only 6 of the mono-osteitic type.

The following case report is presented here because (1) it is definitely a typical case of a single bone lesion, and (2) because of a number of interesting features in the personal and clinical case-history.

## CASE REPORT

Mrs. F.F., Jewish, aged 64 years. On June 1, 1940, she came to my office complaining of a "deformed and forward bowing of the left leg".

*Family history.*—Her father was of small build, about 4 ft. 5 inches in height, and had been healthy all the time. He died at the age of eighty; the mother also lived to be eighty. She had been slightly taller than the father; she had had no serious illness at any time.

The patient has three brothers. Two brothers are very tall; one is short, about 5 ft. 3 inches. She has five sisters, all of medium height. One sister is very tall—about 5 ft. 11 inches; one sister died at the age of 50, cause unknown. All the other sisters are robust and healthy.

The patient has four sons. They are all tall, three about 6 feet, and one 6 ft. 1 inch.

*Past illnesses.*—Measles and chicken-pox when a child. In 1926 the patient suffered from a severe cold complicated by otitis media involving right ear. The condition had apparently cleared up completely. She did not think that her hearing had been impaired at all as a result of this attack.

In 1927 she noticed that her breasts were becoming gradually smaller and shrunken. Within a few months a great number of hard nodules appeared in both breasts.

She consulted me in April, 1928. At that time the breasts gave the impression of small bags filled with hard beans. These latter varied in size from a small bean to the size of a walnut. The nodules were freely movable, not tender nor adherent to the skin. The nipples were not retracted. The axillary glands were not enlarged or palpable. The patient was operated upon and both breasts removed in May, 1928.

The removed breasts showed vast cystic changes. Practically all the parenchymatous tissue had undergone cystic degeneration. Some cysts contained thick sero-sanguineous fluid, others were completely calcified. The diagnosis was undoubtedly chronic cystic disease involving both breasts. The patient made an uneventful recovery.

About 1930 she noticed that she was becoming hard of hearing. The condition had been gradually becoming worse. The ears appeared to be normal.

*Present illness.*—The patient experienced weakness in left leg, which came on gradually and progressively for about two years. The leg felt too weak to support the body, especially so while climbing up stairs. The weakness was chiefly felt from the knee downwards. There was no pain, but the leg appeared to be getting in the way all the time, and was being bumped against objects quite frequently. She had noticed a slight forward bowing of the left leg about two years ago. About a year ago she was accidentally kicked on the left leg about the middle of the shin. The leg was then painful for a few days only. She thought that after this the bowing of the leg became worse. The bowing was so bad that her friends were beginning to notice the condition and she had to wear long dresses and skirts. By the end of the day the affected leg felt heavy, tired and numb. She was, however, doing practically all her housework unaided.

*General physical examination.*—The patient was very slim; height 5 ft. 3 inches; weight 111 lbs. She had lost about five pounds in the previous three months. The arteries were not tortuous, only slightly palpable, and did not appear to be sclerosed. The teeth were carious. The tonsils were slightly enlarged. She wore glasses but her vision was not impaired. The pupils reacted normally to light and accommodation; eye grounds, normal. There was no general glandular enlargement. The thyroid was considerably enlarged, the left lobe being a little nodular. The heart, lungs and abdomen appeared to be normal. Reflexes normal.

*The skeletal system.*—The skeletal system appeared to be normal in every respect, with the only exception that the left tibia bowed forward. The maximum of convexity was a little above the junction of the middle and lower third of the tibia.

## MEASUREMENTS

	Right inches	Left inches
1. Knee to external malleolus .....	16¼	17
2. Circumference of calf 8 inches below knee 12		13¼
3. Circumference of ankles above malleoli ..	9	9
4. Circumference of knee .....	10	10

*Radiographic examination.*—Skull normal; chest normal. The left clavicle was a little more curved than the right, but showed no evidence of disease (see Fig. 1). Spine normal; pelvis normal; femora normal.

Both legs (tibiae) were taken at the same time on one plate (see Fig. 2), thus assuring the same exposure on



both sides. Exposures were made in the antero-posterior and lateral positions.

Right tibia and fibula laterally were normal; left fibula normal. The left tibia showed gross pathological changes as follows. Cancellous bone is very much thickened and irregular. The upper part of the bone showed some decalcification and rarefaction. The medullary canal was irregular and very much narrowed in places. There were a great number of areas of softening (small cysts?) in the medullary canal, and also in the anterior part of the cancellous tissue. The fibula was straight and stood out against the bent tibia like a "string in a bow".

*Antero-posterior.*—The right tibia and fibula were normal (see Fig. 3). The left tibia was considerably wider than the right, irregular and considerably thickened. Density (to x-ray) in the left tibia was much greater than in the right. The density was so great that the medullary canal is only slightly visible in some places. The density in left fibula was also greater than in the right.



Fig. 1

Fig. 2

Fig. 3

*Laboratory tests.*—Urine, normal. Red blood cells, 4,200,000; white blood cells, 6,500; hgb. 90 per cent. *Blood chemistry:* urea nitrogen 15.75; creatinine 1.611; sugar 0.116; calcium 11.5; plasma phosphatase 12 Bodanski units; basal metabolism test -5; blood pressure 190/110. Wassermann test negative. The diabetic curve was within normal limits.

#### COMMENTS

There are a number of interesting points in this case history.

1. Tallness seems to run in this family. All the brothers and sisters are tall, and so are all the sons. This is in conformity with a number of observers who have found that in Paget's disease a history of familial tallness is usually found. It has also been observed that associated with this disease there is usually a familial history of diabetes. Moehlig and Adler,<sup>4</sup> in a series of 26 cases found that 30 per cent gave a familial history of diabetes; 83 per cent a familial history of obesity; and 78 per cent gave a familial history of tallness. Based on these

findings, these investigators believe that the underlying cause of Paget's disease can be traced to a lowered carbohydrate tolerance due to pituitary disturbance. So far as can be ascertained there is no diabetes in this patient's family history.

2. Degenerative changes in various organs, resulting in fibrosis and calcification of soft tissues, are very common in people suffering from Paget's disease. In a series of 26 cases studied by Moehlig and Adler<sup>4</sup> and another group of 12 studied by Moehlig and Murphy,<sup>3</sup> it was found that about 40 per cent had adenomatous goitre, of which 15.5 per cent were calcified; 30 per cent

of the female patients had uterine fibroids, of which 75 per cent have shown some calcification. Arteriosclerosis is exceedingly common in patients with Paget's disease.

This patient does not show definite signs of arteriosclerosis. However, having a blood pressure of 190/110 suggests the presence of arteriosclerosis somewhere in the system. The patient is suffering from a large adenomatous goitre with nodules that appear to be calcified. I could not demonstrate calcification of the nodules by x-ray. Of particular interest is the finding that the patient had been suffering from a peculiar cystic disease of both breasts in which the entire glandular tissue has become fibrosed and calcified.

3. Impairment of hearing is a common complaint in patient's with Paget's disease, especially when the skull is involved. In a series of 116 cases reported by Gutman and Kasabach<sup>1</sup> 26



complained of deafness. This patient is suffering from a definite and progressive impairment of hearing, although by clinical and roentgenological examinations, involvement of the skull could not be demonstrated. It is not likely that the otitis media from which the patient had been suffering years ago is responsible for the present deafness. Firstly, the otitis media was of a mild origin, which cleared up (apparently) completely in a few days. And, secondly, the otitis media was confined to one side only, while in the present complaint both ears are affected.

4. The absence of pain in this case, in spite of involvement of the whole of the tibia is of great significance. A considerable number of patients with Paget's disease have no other complaint aside from deformity. In these cases it is impossible to determine with any degree of certainty the beginning of the onset of the disease. In the great majority of cases, however, pain is usually the first symptom to appear. Pain, when present, is most distressing and constant and very difficult to control. It is specially common when the pelvis, spine or lower extremities are involved.

5. Blood chemistry examinations are of considerable interest in the study of this condition. The constituents that are most intimately associated with bone metabolism, so far as is known, are calcium, inorganic phosphorus, and phosphatase. The study in a large number of cases has shown that the serum calcium and inorganic phosphorus in Paget's disease are either below or within normal limits. The serum phosphatase is always above normal.

Phosphatase is an enzyme which is normally present in the blood plasma, and possesses the property of hydrolyzing phosphorine esters. The

amount of phosphatase in the body is usually expressed in the terms of Bodanski units. The normal level in the blood is 1 to 4 units. An increase in serum phosphatase is found in many conditions of bone lesions where there is an increase in processes leading to new-bone formation, such as carcinoma, etc. The level of serum phosphatase is also increased in the presence of extensive liver lesions. The highest values, however, have been found in Paget's disease. By itself an increase in phosphatase level is of no value in differentiating this disease from any other condition where new-bone formation is taking place. It is, however, of great aid in the diagnosis of the condition when combined with clinical and roentgenological findings.

The extent of bone involvement may be judged roughly from the rate of increase in the serum phosphatase level. In the generalized condition of Paget's disease values ranging as high as 120 to 150 Bodanski units have been found in some cases. In the mono-osteitic type the phosphatase level is usually between 8 to 20 units. In the case under discussion the phosphatase level was found to be 12 units. A low phosphatase level almost always rules out the diagnosis of Paget's disease.

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A skin test which tells within less than an hour whether or not a given woman is going to become a mother was announced by Drs. Frederick H. Falls, V. C. Freda and H. H. Cohen, of the University of Illinois College of Medicine. The test is similar to those made for allergy or hayfever. It is said to be 98 per cent reliable. Previously developed tests for early pregnancy take, according to reports of them, from 18 hours to two days. The widely used Ascheim-Zondek test takes two days for a verdict. In the test developed at the University of Illinois, colostrum is used. This is a watery liquid secreted in the breasts during pregnancy

until milk formation starts after the baby is born. A tiny amount of this is injected by hypodermic needle into the skin of the forearm. If the woman being tested is pregnant, there is no reaction. If she is not pregnant, a reddish area of one or two inches diameter appears within an hour around the injection point, disappearing within about five hours. Besides the speed and economy of the new test, it is said to be valuable because it helps to differentiate between pregnancy and abdominal tumour and also helps to determine quickly the dangerous condition in which the baby starts developing outside the uterus.—*Science News Letter*, March 22, 1941.

## THE USE OF THE NEWER DRUGS\* †

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SOME of the drugs of the sulphonamide group have been in use for about five years. During this time success has attended in succession their use in diseases caused by the *B. hæmolytic streptococcus*, the meningococcus, gonococcus, pneumococcus, the majority of urinary tract infections and in staphylococcal infections. These several advances have followed each other so swiftly that sound principles of chemotherapy have become hidden or forgotten in the distraction of ever occurring novelties. Since almost everyone is persuaded that further sudden and even more brilliant advances are shortly to be expected it is desirable at intervals to review the ground that has been traversed.

## NOMENCLATURE

One of the serious causes of confusion arises from nomenclature. The parent substance of the sulphonamides, (p-amino-benzene sulphonamide) was discovered by Gelmo in 1908. Since there is no patent protection for this drug it

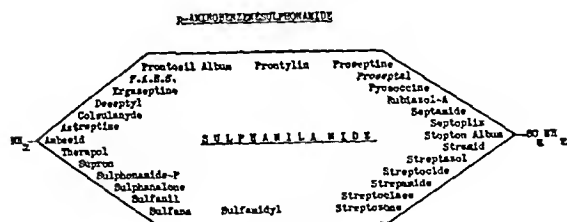


Fig. 1.

would seem only reasonable that one name such as "sulfanilamide" should be used to denote the drug. Fig. 1 indicates how far we are from this happy state.

The "prontosils"‡ which are included in

\* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Section of Medicine, at Toronto, June, 1940.

† The paper is based on clinical experience in the newer drugs on the Medical Service of the Toronto Western Hospital 1936 to 1940. The clinical observations were made with the collaboration of H. T. Kinney, M.D. The conclusions as to the effect of the drugs on the hemopoietic system are based on studies made by J. R. Morgan, Capt. R.C.A.M.C. The daganan was supplied on test by Messrs. Poulenc Frères, Montreal, and the sulfathiazole by Squibbs, of New Brunswick, N.J.

‡ The position of these drugs in therapy may conveniently be dealt with at this point, even if this anticipates the topics which are later to be discussed.

Table I are in one respect the aristocrats of the sulphonamide series. The original prontosil proved the effectiveness of the sulphonamides in streptococcal infection. The prontosils are, unlike sulphonamide, quite inactive *in vitro* and it has yet to be demonstrated that their effectiveness *in vivo* is due to anything but the fact that these compounds are disintegrated in the body to produce sulfanilamide. The sulfanila-

TABLE I.

THE PRONTOSILS AND OTHER SULFANILAMIDE DERIVATIVES (SULFONAMIDES), WHICH HAVE BEEN WIDELY USED.

Trade Names	Remarks
Prontosil Prontosil rubrum Prontosil flavum Sulphamido-chrysoidin	Solid red dye, not in use in the United States of America and Canada.
Prontosil soluble Prontosil Prontosil-S Prontosil II Neoprontosil Bayer 102 Rubiazol injectable Streptozone-S	A much more soluble red dye in common use in United States of America and Canada, either in liquid or solid form. (For discussion, see text.)
Uleron Uleron (U.S.A.) D.B. 90 D.B. 373 Disseptal A	A disulphonamide of German origin which has fallen into disrepute because of its toxic properties.
Proseptasine Soluseptazine	Benzyl derivatives having most of the disadvantages of the prontosils.
M. and B. 693 (Eng.) Dagenan (Canada) Sulfapyridine (U.S.A.)	Of proven worth (see text).
Sulfamethylthiazole	Withdrawn from clinical tests due to toxicity.
Sulfathiazole	Of proven worth (see text).

mid content of these substances is in general about 1/3 of their molecular weight. In other words weight for weight they can at most, in so far as has yet been proved, exert only about the same bacteriostatic efficiency as would be exhibited by 1/3 of the same weight of sulfanilamide. In actual fact, in the human body the elaboration of sulfanilamide from prontosil or neo-prontosil, etc., takes place rather slowly and a great deal of the dyes is excreted intact, staining the urine red. The blood of patients

heavily dosed with prontosil very rarely contains as much as 3 mg. of sulfanilamide per 100 c.c. of blood.

From a lack of comprehension of these facts there has arisen a misconception of the effectiveness of the prontosils in fulminating infections which, as would be expected, they often fail to control. It is of course true that even rapidly fatal septicaemias of *B. haemolytic streptococcal* origin may be caused by strains that are extraordinarily sensitive to sulfanilamide and in these the prontosils have been effective. Since, however, the clinician has no quick way of ascertaining the susceptibility of the bacteriological strain of the streptococcus causing the infection he is on safer ground if he chooses to use adequate dosages of sulfanilamide itself. The usual argument employed to counter this suggestion is that the prontosils are less toxic than sulfanilamide. This half truth, which has received very wide acceptance among practising physicians, also springs from a lack of understanding of the facts already mentioned. If it were certain that the elements in the large prontosil molecule were completely devoid of any toxic action—and this is doubtful—the only toxic action of the prontosils would be due to the sulfanilamide freed by the breakdown of the azotised (prontosil) molecule in the body. On a weight for weight basis we have noted that at the most this could not exceed 1/3 and in actual practice is probably closer to 1/6 or 1/5 of the total amount of prontosil absorbed into the blood stream. It would, under these circumstances, be a much fairer test to compare the toxicity of doses of at least three times as much prontosil to that of sulfanilamide. It is also worth mentioning that prontosil, neoprontosil, etc., stain the blood and tissue fluids red. This effectually masks cyanosis which, as is now recognized, is more alarming to the physician and friends than it is dangerous to the patient. It is unfortunate that it has too often and wrongly been interpreted as a reason for discontinuing chemotherapy.

The prontosils are safe, but not for the reasons usually advanced. They are often ineffectual in very severe infections for the reasons given. Their value is in dealing with infections sensitive to small doses of sulfanilamide, particularly those not immediately dangerous to life and in which delay in pro-

ducing a cure is not of serious import. It is our opinion that for use against potentially lethal infections there are much better drugs available.

For the reasons given the prontosils have confused the minds of many as to the effectiveness of chemotherapy. To the misconceptions fostering such confusion must be added the unnecessary confusion which emanates from the nomenclature (Table I). In Germany, where the original patents of the prontosils are held, the views expressed above would be denounced as heretical; but then in Germany sulfanilamide (rediscovered by the French) is looked upon unfavourably.

Sulfapyridine, mercifully, has not yet become an obsession among those who have a flair for devising synonyms. It is known in England as "M. & B. 693"; in Canada as "dagenan" (a corruption of Dagenham where it is manufactured), and in the United States as "sulfapyridine". It is conceded that it is quite effective against the organisms susceptible to sulfanilamide and has in addition the power of inhibiting the growth of the pneumococcus.

Sulfathiazole has now emerged from extensive clinical trials. It has the valency of sulfapyridine with an added power of combating infections caused by some strains of the staphylococcus aureus.

#### MODE OF ACTION

While it is true that the empirical work of earlier investigators was supported by animal experimentations and that the contributions of Domagk, Colebrook, Nitti, Long, Marshall and their collaborators,—to mention only a few—provided a sound basis for safe treatment and clinical research, yet the key essential to a complete understanding of chemotherapy has remained elusive. Most observers have agreed that the action of sulfanilamide was one of growth inhibition or bacteriostasis, but how or why bacteriostasis was brought about was not known. Some measure of success has lately seemed to reward the efforts of the numerous workers engaged in the search for the mode of action of the sulphonamides. In a recent article Fildes, reviewing the researches initiated by Lockwood and pursued by McIntosh, Fleming, Whitby, Stmp, Green, Woods, Selbie and Fildes, states that the results are "in agreement" in ascribing the action (of sulfanila-

mide) to interference with bacterial enzymes associated in some way with nutritive substances". In other words, sulfanilamide starves *hemolytic streptococci* by blockading them from an essential food. Woods has shown that *in vitro* para-aminobenzene sulphonamide (sulfanilamide) apparently causes bacteriostasis of the streptococcus by interfering in the utilization by the latter of a substance (para-aminobenzoic acid) which is supposedly essential to the growth and multiplication of the streptococcus. Selbie has advanced evidence that the same is true *in vivo* for mice. This interference, it is suggested, is effected by the seizure by sulfanilamide of an enzyme system which is the necessary vehicle in making para-aminobenzoic acid utilizable by the *hemolytic streptococcus*. It is further suggested that competition for the enzyme system by these two substances is made possible by their similarity of structure and that *such competition obeys quantitative laws*.

The conception of a quantitative competition for a single vehicle would serve to explain, in part at least, a number of hitherto imperfectly understood features of the action of sulfanilamide both in the laboratory and in clinical medicine. For example both in cultures and in patients there is a lag period of 5 to 6 hours before the bacteriostatic effect of sulfanilamide becomes manifest. This may be attributed to the time required for the blockade to produce the telling results of deprivation. Further, the action of certain substances such as peptone (Lockwood), which have been demonstrated to inhibit the bacteriostatic action of sulfanilamide in cultures and which contain para-aminobenzoic acid becomes explicable.

A wide clinical application of the above mentioned theories is not yet justifiable, but it is perhaps permissible to browse on the edge of the field of speculation. For example it is obvious, assuming the validity of Fildes's views, that organisms not dependent upon a particular enzyme system for the utilization of para-aminobenzoic acid, or those which are less dependent upon this metabolite will not easily be susceptible to sulfanilamide. If it can be shown that it is only through this restricted channel (and there are of course other theories) that sulfanilamide exerts its bacteriostatic effect then diseases caused by bacteria which are immune to this form of attack are quite unsuitable for sulfanilamide therapy. We are doubtless on the verge

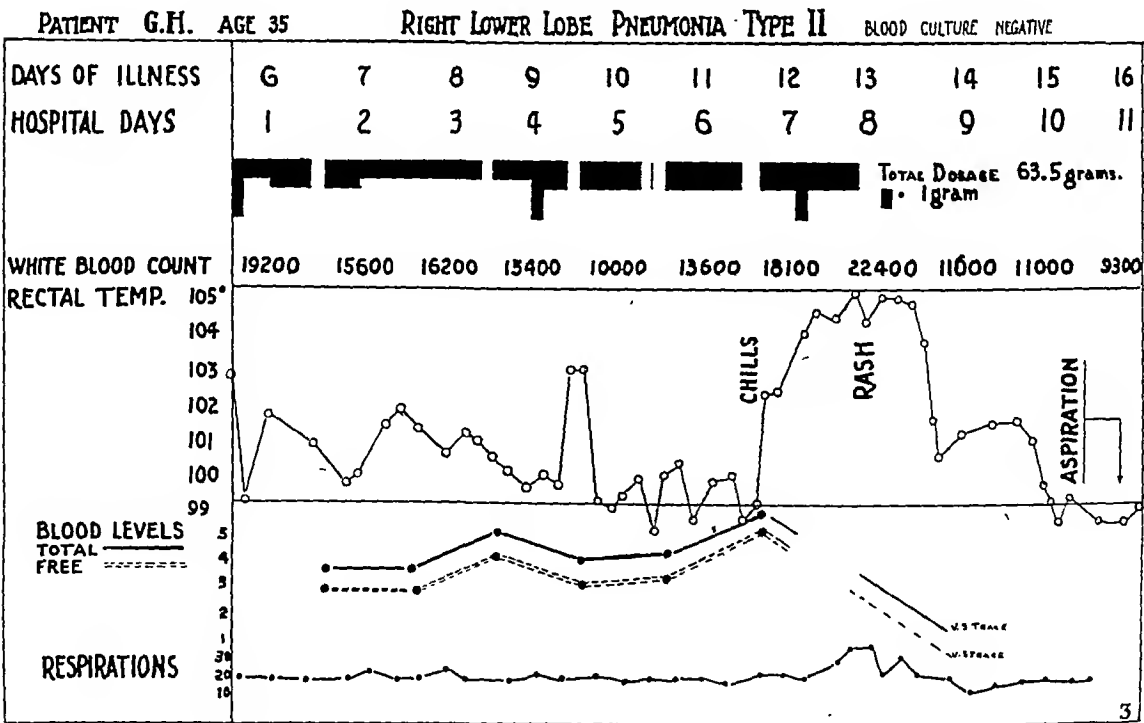
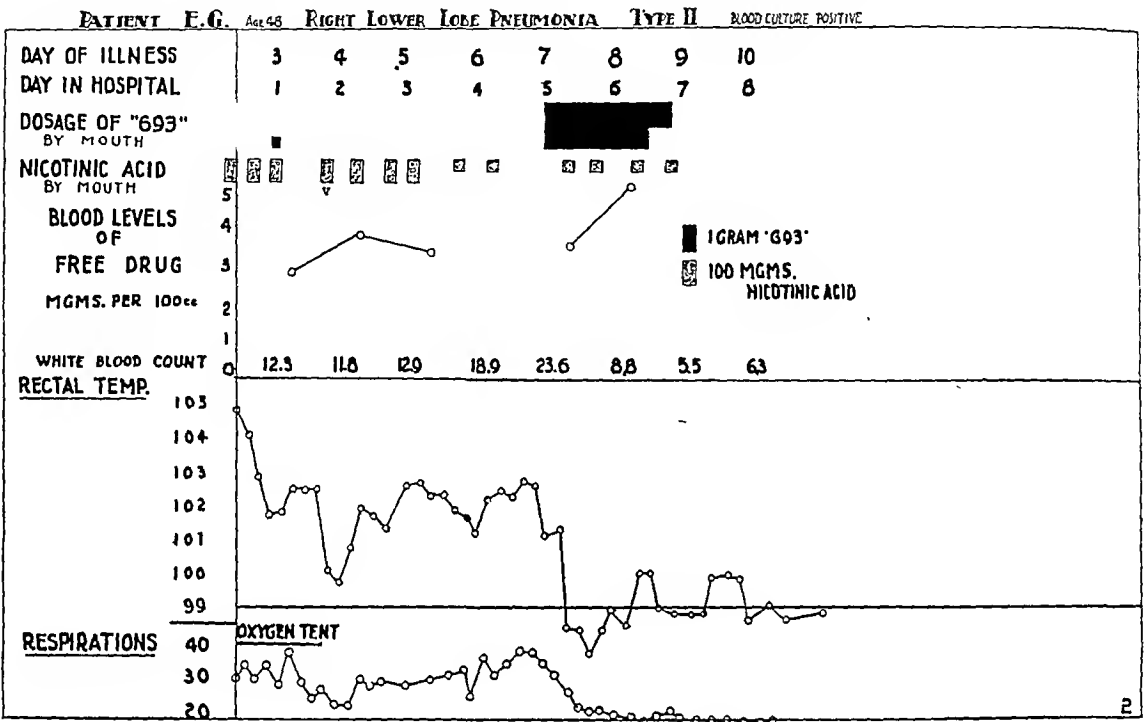
of a great many discoveries in the field of what might be termed nutritional or biochemical bacteriology which will finally dictate our selection of chemo-therapeutic weapons against human disease. Secondly the "quantitative competition" hypothesis provides cogent support for early and adequate dosage in chemotherapy. The blockade aimed at producing starvation of the streptococcus should be fully operative at the earliest possible moment. In fulminant cases the first dose should be large enough to achieve this object. Thirdly, since streptococci themselves have been demonstrated to contain para-aminobenzoic acid it is probable that pus containing the dead streptococci and tissue debris is also rich in this substance so that the failure of sulfanilamide in the treatment of closed abscesses is clarified.

Fildes has drawn attention to the cousinship in molecular structure of sulfapyridine and nicotinic acid or vitamin B<sub>2</sub> (pyridine ring). As in the case of sulfathiazole there is as yet no published work to support the purely hypothetical suggestion that sulfapyridine acts to blockade the utilization of the essential metabolite, nicotinic acid, from bacteria and from the cells of the host. The idea rests only on the expectation "that the antibacterial substance should have a chemical similarity to the essential metabolite". If, however, it should be proved that sulfapyridine interfered with nicotinic acid utilization there would be grounds for believing that the administration of nicotinic acid might, on the quantitative competition hypothesis, act as an antidote to sulfapyridine. Such highly speculative theorizing would have no legitimate place in a paper of this character were it not the case that some pharmaceutical firms are producing tablets containing sulfapyridine associated with nicotinic acid. Until the position becomes much clearer than it is at present it would seem wiser to await the result of further research.

About one year ago at the writer's suggestion we administered nicotinic acid in doses of 200 mg. per day to 21 cases of pneumonia which were receiving intensive sulfapyridine therapy. We did this in the hope that nicotinic acid might diminish the incidence of vomiting. A decrease in the frequency and severity of vomiting was sometimes apparent but we discontinued the practice because it was noticed that in two cases there seemed to be an unsatis-

factory response to sulfapyridine when nicotinic acid was given (Fig. 2). Since Fildes' paper appeared these cases have been again reviewed. In 19 cases the level of sulfapyridine in the blood was over 8 mg. per 100 c.c. In other words these cases fell into a group which were being treated on a very intensive dosage.

In none of these cases was there any indication that the administration of nicotinic acid in any way modified the effective action of sulfapyridine. The remaining two cases failed to absorb the drug well (levels in the blood were not higher than 5 mg. per 100 c.c.) and in both there was some evidence of inhibition of sulfa-



pyridine effectiveness (Fig. 2). It is, however, noteworthy that one case while receiving heavy dosage along with 25 mg. of nicotinic acid with each dose developed a drug rash and drug fever. These results are quite inconclusive but they suggest that nicotinic acid should not at present be given with sulfapyridine because it possibly may interfere with effective action of the latter upon bacteria.

#### THE PRINCIPLES GOVERNING THE USE OF CHEMOTHERAPY

The discoveries reviewed by Fildes, however unready in detail for application at the bedside, may provide a rational working basis for the clinical use of the newer drugs. Certain broad principles which were already known or were being recognized have by this work received timely and substantial support.

In earlier papers it was not infrequently emphasized that the most dramatic cures occurred in the most acute infections. Septicæmia due to meningococci or streptococci were often quickly arrested by adequate chemotherapy, whereas chronic infections with abscess formation were notoriously difficult to combat. All physicians are able to differentiate the invasive phase from the chronic or entrenched stage of a disease. The necessity for so doing is of prime importance. It is in the invasive stage (Table II) that chemotherapy is of most value. From Fildes' review it can be appreciated why this is so. If we visualize the onset of a streptococcal infection as an invasion effected by organisms whose hope of conquest lies in their power to multiply a million fold on the battlefield itself, then it is clear that they are most vulnerable when they are living off the country; while they are forced to forage. During the invasive stage

they are seizing the food designated for the defender and if at one blow this can be denied them their power of multiplying is gone and it remains only for the defender to mobilize his forces, totally to exterminate them. This sudden blockade can, we have seen, be instituted by the newer drugs. If on the other hand the starvation tactics are not used, or used only in half measures, it is possible that the invaders become numerous enough to get a footing from which they cannot be dislodged by an attempt at starvation. We have seen that in this stage streptococci, for example, soon have enormous supplies of essential food stuff by the production of pus and with this secured the earlier effectiveness of the chemotherapeutic weapon (quantitative competition) becomes relatively powerless and its continued employment may soon become a greater menace to the patient, whose tissues also require the essential metabolites, than to the entrenched organisms.

In the invasive stage then the slogan should be "hit quickly, hit hard and keep on hitting". "Hit quickly" because the bacteria are multiplying at an enormous rate and threaten to overwhelm the defenses of the body. "Hit hard" because if maximum benefit is to follow therapy enough of the drug must be present successfully to compete, in a quantitative way, for the sources of supply. "Keep on hitting" because too rapid withdrawal of the drug may find the defenses of the body still imperfectly mobilized.\* When this is the case exacerbation of the acute phase may occur, followed by what is worse, the destruction of the integrity of the

\* Except in meningitis it is seldom wise or necessary in acute infections to continue chemotherapy longer than 8 days.

Fig. 2.—Illustrating the clinical course of a patient who received daganan and nicotinic acid concurrently. Bacteriostatic tests showed that the particular pneumococcus was very susceptible to daganan *in vitro*; inhibition of growth being complete in the presence of three and five mg. of daganan per 100 c.c. There was an initial improvement of the patient corresponding with the use of oxygen, daganan and nicotinic acid, but the fourth dose of nicotinic acid was not retained (indicated by "V"—vomited, in the chart). The crisis occurred on the 7th day of disease and coincided with increased administration of daganan with the attainment of higher blood concentrations and a reduction in the amount of nicotinic acid being given. The probability is strong that a natural crisis occurred at this time. The suggestion is that something (nicotinic acid) interfered with action of daganan in this patient in the earlier days of chemotherapy. Fig. 3.—The clinical progress of a case of pneumonia treated by sulfathiazole until drug intoxication became grossly evident as shown by chills, dyspnea, fever, leucocytosis, tachycardia (130 per minute), the appearance of conjunctivitis and a drug rash. On the 8th day of treatment copious diuresis following the administration of over 4,000 c.c. of fluids (2,000 c.c. of intravenous 5 per cent glucose saline). The urinary output rose to 4 litres and over 10 grams of sulfathiazole was excreted in 48 hours (8th and 9th hospital days). The rash lasted three days. The chest was aspirated on the 11th day in hospital and 100 c.c. of sterile straw coloured fluid was withdrawn. The patient made an uneventful but slow recovery. Signs of delayed resolution persisted until the 40th hospital day but the illness ran an afebrile course after the 10th day in hospital.

tissues, and the establishment, with collections of pus, of a subacute or chronic stage.

It has been insufficiently realized that the use of chemotherapy in the chronic stages of infections requires a different technique from that employed in the acute cases. Here massive doses are seldom justified. If moderate doses are not quickly effective continued dosage is unlikely to lead to anything but drug intoxication of the patient. It is important to realize in both acute and chronic stages of infections that if a decisively beneficial result is not obtained within 48 to 72 hours with an adequate amount of the drug, either chemotherapy will fail, the organism being insensitive to this form of attack, or additional measures are necessary. It cannot be emphasized too strongly that chemotherapy has in no way altered an old surgical dictum "where there is pus let it out". Today there is less danger in pus-letting if an effective drug is used before,

during and for a few days after the operation. It may prevent a further and disastrous spread of the infection and constitutes no complication of the necessary anaesthetic procedures. On the other hand, long continued dosage by the newer drugs with delay in surgical drainage is not only useless but positively dangerous.

It should never be forgotten in these days of enthusiasm for the newer drugs that the human body has potentially great powers of defence against infections. These defences require time for their elaboration. Very virulent infections are rapidly lethal because the onset of the attack is carried out at a tempo which overwhelms the defences before they can be organized. The newer drugs, effectually used, are capable of holding the invaders in check until the "immunity mechanism" of the patient is in a state to fight them off. In the final analysis it is the antibodies themselves and not the chemotherapeutic agents which exterminate the invading

TABLE II,  
EFFECTIVENESS OF THE NEWER DRUGS IN TREATMENT

Drugs	Stage of disease	Organism	Clinical diagnosis	Effectiveness
Sulfanilamide Sulfapyridine Sulfathiazole	Invasive or before the purulent lesions develop.	<i>B. Haemolytic streptococci.</i> Meningococci. Gonococci. <i>E. coli.</i>	Early middle ear infections and mastoiditis. Cellulitis. Erysipelas. Puerperal sepsis. Septicæmia. Urethritis and arthritis. Pyelitis, Cystitis.	Curative. (Sulfanilamide is usually the drug of choice.)
		Other urinary infectors excepting enterococcus faecalis.	Pyelitis, Cystitis.	Fairly satisfactory. (Especially sulfathiazole which also has some action on streptococcus faecalis.)
Sulfapyridine Sulfathiazole	Invasive or before abscess formation.	Pneumococci.	Pneumonia.	Curative.
Sulfapyridine Sulfanilamide	Invasive.	Streptococci. Meningococci.	Meningitis.	Curative in heavy dosage. (Serum advisable as well with meningococci.)
Sulfapyridine	Invasive.	Pneumococci.	Meningitis.	Curative in heavy dosage. (Serum advisable as well with meningococci.)
Sulfathiazole	Invasive before purulent lesions develop.	Staphylococcus aureus.	Septicæmia. Cellulitis.	Curative for some strains.
Sulfanilamide Sulfapyridine Sulfathiazole	Chronic stages with purulent lesions.	Any of the above.	Any of the above.	Poor or nil. (Surgery is required when possible.)

Chemotherapy is worth a short trial in the following diseases with some hope of its being effective:

Staphylococcal infections

*C. Welchii* infections

Friedlander's bacillus infections

*H. Influenzae* meningitis

Chemotherapy alone is scarcely worth a trial or is of no value in the following:

All abscesses (empyemata, etc.)

Tuberculosis

Virus diseases

Typhoid fever

Brucellosis

Ulcerative colitis

Venereal lymphogranuloma

Scarlet fever

Rickettsial diseases

Rheumatic fever

Rheumatoid arthritis

Typhoid fever

Plague

Ulcerative endocarditis

*Streptococcus viridans* endocarditis

Infectious mononucleosis

Malaria

Spirochætal infections

Fungus infections.

bacteria. Disregard of this profoundly important fact implies a misunderstanding of the proper employment of the newer drugs, and has led to widespread abuses. The time probably will come when tests revealing the degree of mobilization of the biological defensive system *vis à vis* the particular infecting organism will be used to indicate when chemotherapy may be safely discontinued.

Other considerations bearing on this aspect of the problem also deserve notice. In our opinion to deny a patient, seriously ill with pneumonia, adequate anti-pneumonia serum when sulfapyridine or sulfathiazole are not being decisively effective is worse than evidence of poor judgment. We also make it a rule that patients whose blood contains less than 55 per cent of hæmoglobin must have blood transfusions in addition to whatever chemotherapy is being employed. There has been some suggestive evidence that the sulphonamides may in some way alter the characteristics of the recipient's blood so as to render blood groupings more uncertain and thus increase the danger of transfusion reactions. We have on four occasions witnessed unexpected and severe reactions to transfusions with what appeared to be compatible blood but we are not yet prepared to admit that we believe them to have been entirely due to the action of a sulphonamide derivative.

#### DOSEAGE

The common indications for the selection and use of sulfanilamide, sulfapyridine and sulfathiazole are shown in Table II. It remains to discuss the amounts of the various drugs which should be used. In severe infections endangering life, such as septicæmia, meningitis, gas gangrene and pneumonia it is imperative that the appropriate drug should be employed at once in massive doses. When confronted with such a problem we must depend initially upon our knowledge of pathology and on our clinical observations. The use of the swab or blood culture must not be omitted before treatment is begun. The report on the cultures usually will be available in from 24 to 72 hours and if by that time no favourable response has been achieved with the particular drug in use a change should be made to a more appropriate drug (Table II) or to an alternative treatment. Incidentally, I have never seen any harm arise from following one drug with another unless signs of drug poisoning were already manifest.

The dosage for very severe infections, such as those under consideration, should be designed to raise the blood concentration to between 10 to 15 mg. per 100 c.c. of blood as soon as possible in the case of sulfanilamide, and to between 4 and 7 mg. per 100 c.c. in the cases of sulfapyridine or sulfathiazole. With sulfanilamide this can be done by giving  $\frac{1}{2}$  grain for every pound of body weight in the first dose.\* A man of 150 lbs. in weight should receive 75 grains in the first dose along with 20 grains of sodium bicarbonate. About one-fourth of the initial dose should then be given every 4 hours with 10 grains of sodium bicarbonate during the acute stage of the illness. As soon as marked improvement has become manifest—and this should happen within 48 hours—the maintenance dose should be reduced at first by one-third and later to one-third every four to six hours. The drug should be continued in small doses until obvious signs of active infection have disappeared.

After a good deal of trial and error we have adopted the following schema of dosage for adults in the use of sulfapyridine and sulfathiazole in the treatment of pneumonia. The initial dose should be large because it is unlikely that it will cause immediate vomiting and it is essential to raise the blood levels to the optimal levels at once. Three to 4 grams (45 to 60 grains) should be given in the first dose and maintenance doses of 1 gram (15 grains) to 1.5 grams every four hours should follow for the next 48 to 72 hours after which some modification is desirable. Pneumonia patients seldom require such treatment for longer than 6 to 7 days unless complications (empyema, etc.) are present. Persistence of fever and illness should always stimulate a search for such complications. It should be remembered however, that fever, sometimes with a rash, is not infrequently due to drug intoxication.

In cases of pneumococcal meningitis or staphylococcal septicæmia the initial doses of sulfapyridine or sulfathiazole respectively should follow that outlined for sulfanilamide; the infection being so dangerous as to warrant the strongest possible attack. It is important to recognize that sulfathiazole does not easily pass over into the cerebrospinal fluid and is therefore quite unsuitable in cases of meningitis.

\* In the very obese the ideal weight should be taken as there is evidence that fat does not take up as much of the drug as does useful tissue.



### INTRAVENOUS THERAPY

In the event that the drugs cannot be given by mouth or when analysis of the blood shows that despite adequate oral dosage the absorption has been insufficient it is necessary to fall back on injection methods. Sulfanilamide is soluble in about one part in 100 in saline or suitably buffered solutions (1/6 N sodium lactate). A 0.8 per cent solution is thus easily prepared by bringing the sterile solvent to a boil for a few minutes and after removing from the flame adding the appropriate amount of crystalline sulfanilamide. In one case (gas gangrene) the writer has injected 6 grams in a single dose intravenously without any ill effect. If need be such solutions of sulfanilamide may be injected subcutaneously.

Sulfapyridine and sulfathiazole are so very insoluble at body heat that the sodium salts must be used for intravenous or intramuscular therapy. These are very soluble in distilled water and should not be used intravenously in strengths higher than 5 per cent, and should be injected slowly. They are both strongly alkaline and on this account should not be given subcutaneously.

### DOSAGE IN MILD INFECTIONS

Infections which are chronic or semi-chronic or those which are of low virulence are frequently disappointing in their response to chemotherapy, (excepting those causing urogenital disease). In such infections the doses advocated above may be cut in half. Even in these reduced amounts it must be stressed that prolonged treatment without distinct evidence of improvement is dangerous. Clinical trials of chemotherapy in such infections in the absence of suitable bacteriological evidence are sometimes unavoidable but such trials should be tentative and of short duration. It is less dangerous to give a short course of 48 to 72 hours of intensive therapy than to continue with small doses for over 10 to 15 days.

### THE LOCAL APPLICATION OF THE NEWER DRUGS

Reports of an encouraging but tentative character have appeared in both surgical and dental periodicals on the topical use of sulfanilamide, sulfapyridine and sulfathiazole in locally infected areas. Experience in the treatment of empyemata by injecting suldagenan (sodium sulfapyridine) into the pleural cavity has yielded disappointing results

and this failure has served to emphasize the necessity for surgical drainage in such cases. Three and one-half years ago we tried treating moribund cases of generalized peritonitis by multiple intraperitoneal injections of 0.8 per cent sulfanilamide in saline but the results were poor. On the other hand the introduction of 3 to 5 grams of the powdered (pure) crystals of sulfapyridine or sulfathiazole through an incision into the peritoneal cavity in cases of generalized peritonitis following the rupture of an appendix or a duodenal ulcer has in our experience yielded excellent and very encouraging results. Such procedures are still in the experimental stage and should be carried out with due regard to the possible generalized toxic reactions which may follow them.

### THE TOXIC MANIFESTATIONS OF THE NEWER DRUGS

The newer drugs are toxic. They may, while being used to thwart a fatal outcome, be themselves the cause of death. They are occasionally dangerous even in moderate doses for some individuals. These facts are not to be denied. The same is true of a large number of drugs which are in every day use; but with these long experience has enabled us to evolve safe rules governing usage. On the other hand improper evaluation of the toxic reactions of drugs often has led the cautious physician to deny the patient the full benefit of therapy. Between the limits of careless abandon and excessive timidity lies the province of success without tears.

### MILD TOXIC REACTIONS

There are certain toxic manifestations of the newer drugs which, even in moderate severity, are not contraindications to the continuation of chemotherapy. Into the category of mild toxic reactions fall the following: headache, anorexia, nausea, vomiting, cyanosis, dizziness, depression, somnolence, ringing in the ears, blurring of the vision, monotony of speech and diarrhoea. Of these, with sulfanilamide, headache, cyanosis and dizziness are very common, whereas nausea, anorexia, vomiting and depression are much more common with sulfapyridine. Sulfathiazole gives rise less frequently to nausea and vomiting than sulfapyridine and very seldom, if ever, causes cyanosis.

*Vomiting* caused by sulfapyridine can be very severe and exhausting. It may thus militate against recovery both by its effect on the patient and the barrier it may erect against continued treatment. Although it is apparently of central origin yet there is evidence that local irritation may play a part in its causation. Because of this the administration of 1 gram of the powdered tablets in 1 drachm of  $\frac{1}{2}$  B.P. strength of fresh mucilage of tragacanth often reduces the severity of this complication or prevents it altogether.

*Cyanosis*, as has been said, is a much exaggerated cause for alarm during treatment by sulfanilamide. Earlier it was considered likely that much of the cyanosis was due to sulphæmoglobinæmia. This view has now been abandoned and with it have gone the many dietary restrictions (onions, eggs, sulphates, etc.) which were once imposed. The cyanosis is usually due to either methæmoglobinæmia, or to a breakdown product of the sulphonamides or to both together.

*Dizziness*.—It is important to limit the activities of people who are taking sulphonamide derivatives. They should not be permitted to operate machines requiring precise manipulation or judgment. They should never drive automotive vehicles.

#### REACTIONS OF MODERATE SEVERITY

Next to be considered are those toxic reactions which although by themselves not necessarily fatal may nevertheless be either the precursors of more dangerous sequelæ, or if neglected may cause progressive and grave deterioration of the condition of the patient. As soon as these side-effects become apparent, treatment should at least be interrupted if not terminated altogether.

*Nervous twitching*.—Convulsive movements of localized muscle groups sometimes becoming multiple are occasionally seen when the concentration of sulfapyridine in the blood rises to high levels.

*Delirium*.—It is not generally recognized that mental disturbance amounting to mania which lasting for days and occasionally for weeks or months may be caused by intoxication by the newer drugs. In our experience this has been most frequently seen when sulfapyridine has been used.

*Peripheral neuritis* is a rare complication which in our experience has been observed with

both sulfapyridine and sulfanilamide. Its frequent occurrence marred the otherwise considerable promise of the drug "Uleron" and was the reason for the withdrawal of sulfamethylthiazole during the progress of clinical trials.

*Acidosis*.—Because the administration of sulfanilamide is accompanied by a considerable loss through the kidneys of bases (*e.g.*, sodium) there is a distinct danger of acidosis occurring. Sodium bicarbonate is therefore always given with sulfanilamide. This is not the case with either sulfapyridine or sulfathiazole.

*Rashes and fevers*.—All three of the drugs under consideration may cause pyrexia and cutaneous eruptions. These usually occur from the sixth to the ninth day, seldom before the fourth day but have been observed during the first few hours of chemotherapy. Patients who have previously exhibited drug rashes and fevers while receiving sulphonamide derivatives usually show similar and often earlier and more severe reactions on readministration of such drugs. As a general rule, to which there are exceptions, rashes usually follow a variable period of drug fever. They are always signs of drug intoxication and are rightly considered as justification for the immediate termination of chemotherapy. The rashes of sulfanilamide and sulfapyridine are usually macular or maculo-papular, sometimes scarlatiniform and rarely exfoliative in character. Unless the drug intoxication is very severe the conjunctivæ escape. Exposure to sunlight is a predisposing factor in their appearance. They occur in from 6 to 8 per cent of cases.

Sulfathiazole is particularly likely to produce rashes of a type resembling erythema nodosum or urticaria although both scarlatiniform and macular rashes have been observed. The pseudo-urticarial or erythema-nodosum type of rash commonly appears on the forehead and malar regions, on the forearms and hands, shins and feet and is very frequently accompanied by a conjunctival infection or even hæmorrhage. When very severe the mucous membrane of the lips, mouth and throat may erupt and become painful.

The occurrence of a drug fever during the treatment of a febrile illness is often extremely difficult to detect. It used to be thought that these drug fevers were unaccompanied by either chills or leucocytosis but as clinical ex-

perience has been accumulated this view has had to be modified. Especially in the case of sulfathiazole, but also true of sulfapyridine, fever swinging to 103 or 105° not infrequently accompanied by chills and a marked leucocytosis (as high as 35 to 40,000 has been observed) is not at all unusual in severe drug fevers. More usually the leucocytosis is only moderate and chills are absent. The appearance of a rash is of course a tell-tale indication of the true state of affairs but as this is frequently late in occurrence the clinician may be placed in a very difficult position. The writer has noticed that at the height of a drug rash it is common to find râles and sometimes altered breath sounds at the bases of the lungs. I have also made the mistake of believing that the increased fever, pulse and respiratory rates, leucocytosis and spread of minimal signs in the lungs were indications of an extension of an infective pneumonia and have recognized the error only when the rash appeared (Fig. 3). Such patients are on the basis of the physical signs unaccountably very ill. After the fourth day of chemotherapy, if a thorough physical examination fails to provide a reasonable basis for either a continuing fever or an unexpected rise in temperature and leucocytosis, it is always wise to interrupt chemical treatment and see what then occurs. When treatment is interrupted by reason of toxic manifestations the fluid intake should always be augmented in an attempt to remove the drug from the body as soon as possible.

*Hepatitis.*—There is reason to believe that the sulphonamide drugs may cause hepatic damage. The appearance of jaundice during chemotherapy is usually considered as an indication for the discontinuance of treatment. On the other hand cases having jaundice beforehand have been successfully and, apparently, safely treated by these drugs.

#### THE GRAVER TOXIC MANIFESTATIONS

There are only two important toxic effects of the newer drugs which have been known to cause death. These are damage to the urinary organs and tract and damage to the formation or the integrity of the cellular elements of the blood.

*Renal irritation and anuria.*—The urinary complications of chemotherapy arise chiefly from supersaturation of the urine by the conjugated or acetylated compounds of the several drugs. There is in addition the probability that high

blood concentrations of the drugs even in the free or unconjugated form may cause a toxic degeneration of the renal epithelium, especially when such high blood concentrations are the result of urinary retention. Sulfanilamide and sulfathiazole in the absence of renal retention are not rapidly acetylated or conjugated in the body. The more insoluble acetylated forms of the drugs are therefore not present in large amounts and hence are less likely to be excreted under conditions of supersaturation in the urine. With sulfanilamide very few instances of this occurring have been reported since owing to its greater solubility acetylsulfanilamide seldom crystallizes out in the urine. Acetyl sulfathiazole is the most insoluble of all the drugs under consideration, and its crystals are often present in the urine. It is therefore a potential, although apparently to date, a seldom incriminated source of trouble. Possibly it owes some of its immunity from bad report to the fact that the experience with sulfapyridine has led to its more cautious clinical use.

Sulfapyridine is not only acetylated very rapidly but is also excreted more slowly than either sulfanilamide or sulfathiazole by most patients. The acetylated form of the drug is very insoluble and precipitates as small flat lanceolate-shaped crystals which may possibly irritate the renal tissues and cause gross hæmaturia. The crystals may clump together in the tubules or more frequently in the renal pelvis and ureters and cause obstruction and oliguria or even anuria which may be accompanied by pain in the loins. The administration of alkalis does not lessen this danger and the only effective preventive measure is the maintenance of a urinary flow of greater than 1,000 c.c. in 24 hours. Fluid restriction during treatment with sulfapyridine is fraught with danger and this is increased by the vomiting which is induced by the drug. The fluid intake should not fall below 3,000 c.c. in 24 hours. Since there is some evidence that sulfapyridine may cause a toxic nephritis, cases which have been rendered anuric are properly treated at first by intravenous injections of 300 to 400 c.c. of hypertonic glucose solution (25 to 50 per cent). If no relief from the anuria is obtained by this means within 12 hours recourse should be had to a cystoscopic introduction of ureteric catheters into the plugged ureters and lavage of these channels by sterile water.

*Toxic effects on the Red Blood Cells.*—Sudden severe acute anaemia accompanied by hæmolytic jaundice may occur at any time during treatment by sulfanilamide. The other two drugs are much less culpable in this regard although all may cause anaemia of gradual onset. Death is usually easily avoided by the alert physician with the immediate cessation of chemotherapy and transfusions.

*Toxic effects on white cell production.*—Although all three drugs may cause a rapid decrease in the production of the polymorphonuclear elements the culpability falls in the order of sulfapyridine, sulfanilamide and sulfathiazole. Long-continued treatment (over 10 days) with even moderate dosage of sulfapyridine is particularly likely to cause agranulocytosis which may occur without 24 hours' warning. When the white cell count falls to 5,000 cells per c.mm. a very careful watch must be kept on the differential count. Should the proportion of the polymorphonuclear cells begin to fall toward 50 per cent of the total count the signal has been given to discontinue chemical treatment and administer fluids to free the body of the drug. Some cases of complete agranulocytosis recover spontaneously but in the majority of instances no treatment is of avail in thwarting the fatal outcome. Leukopenia of milder character is also more commonly a complication of sulfapyridine than of sulfanilamide and sulfathiazole.

By way of summary it may be said that sulfanilamide is still the best drug against the infections in which long experience has proved its usefulness. It may be that sulfathiazole will displace it from this position but until this drug has received further trial sulfanilamide should retain its old place both by reason of its effec-

tiveness and the clear recognition of its toxic properties. Sulfapyridine in our experience has the same valency, somewhat more potent in some instances, as sulfanilamide and in addition is very effective against pneumococcal infections. Its chief disadvantage in use lies in its very toxic properties. This is by no means confined to nausea and vomiting but extends to its very serious urinary complications and a greater general toxicity, including the hæmopoietic system. Sulfathiazole has a very effective action within the valencies of both sulfanilamide and sulfapyridine as well as being more potent in some staphylococcal infections. Against pneumococcal infections although quite effective it is usually not as dramatic in action as is sulfapyridine, there apparently being a longer "lag" period and therefore a less rapid fall in temperature. It is not of value in meningitis and occasionally fails to control pneumonia in which sulfapyridine is later found to be effective. It is apparently much less toxic than sulfapyridine but should be used with the same caution which is necessary when giving any of the sulphonamides. Restriction of the fluid intake is dangerous when either sulfapyridine or sulfathiazole are used.

In the use of all three drugs short intensive dosage is less dangerous than long-continued chemotherapy with small doses. When used to combat potentially lethal infections these drugs should be given in heavy initial doses and entirely withdrawn if they are ineffective after 48 to 60 hours. Constant vigilance is necessary to guard against the occurrence of the severer toxic reactions. Estimations of the hæmoglobin and the white blood count should be made frequently and a careful watch kept on urinary output.

Since the introduction of aspirin forty-one years ago by Dreser, many reports have appeared on the adverse effects which may follow its unwise use. These have included depression of the heart, habit formation, miscarriage in pregnancy, and idiosyncrasy causing such alarming symptoms as urticaria (hives), pruritus (itching), erythema (redness of skin) and generalized angioneurotic oedema (swelling of the skin due to a blood vessel disorder). Cutaneous (skin) eruptions of various

forms are not unknown, and even ulceration and gangrene have been attributed to its use. Because of the irritant action of the products containing the salicyl group on renal epithelium (the outer covering of the kidney) acetylsalicylic acid is contraindicated in nephritis (kidney inflammation). Other persons especially susceptible to undesirable effects of the drug are drunkards and persons with diabetes. In the latter groups, adverse effects show a special relation to the nervous system.—*J. Am. M. Ass.*

## PNEUMONIA IN INFANCY AND CHILDHOOD\*

BY NELLES SILVERTHORNE, M.B., ALAN BROWN, M.D., F.R.C.P. (LOND.) AND  
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THE present communication is a report on pneumonia in infants and children. No attempt is made to review the voluminous literature on this subject. A comparison of various forms of treatment is made.

The histories of patients with clinically proved primary pneumonia are reviewed. No cases are included with complications, *e.g.*, prematurity, congenital heart disease, oesophageal atresia, nephritis, etc. Most of the patients were seen and examined clinically by one of us, and nasal or sputum cultures were examined by the method described by Auger.<sup>1</sup> Three methods of treatment were used as follows: (a) treatment, which mainly consisted of fluids by mouth, mustard applications to chest, aspirin by mouth, and in certain cases oxygen box or tent therapy; (b) sulfapyridine in adequate dosage, *i.e.*, blood levels of approximately 4 mg. per cent or over; (c) Type I pneumococcus rabbit serum in patients with Type I pneumococcus pneumonia.‡ In the 1937-38 group very few cultures of the sputum or nasal secretions were made, and in many instances blood cultures were not examined. In most patients in the 1938-39 group blood cultures were examined, sputum or nasal secretions were cultured, and x-ray examinations of the chest were made. The basis for a definite diagnosis was a positive history, positive physical findings, a typical clinical course, and positive x-ray and bacteriological findings in the cases in which these procedures were done.

The cases were divided for purposes of comparison into two groups, namely patients under 2 years of age and those from 2 to 14 years of age. In addition, pneumonia caused by all bacterial species and pneumococcus pneumonias were studied separately.

We have found that pneumonia under 2 years of age is usually of the broncho-pneumonic type as confirmed by post-mortem examination. During the year 1937-38, (October to September) 112 case histories were reviewed of patients who had uncomplicated pneumonia. During this year very few sputum cultures were examined. The duration of the disease in this group before treatment averaged 3 days. The course of the disease after treatment was inaugurated until clinical improvement (*i.e.*, marked fall in temperature curve and improvement or absence of chest findings) was found to be on an average 7 days. In other words, the average total duration of the disease in this group of 112 patients was 10 days. In this group there was a case fatality rate of 20 per cent. In the 1938-39 group (October to September) 28 patients were treated in the same manner adhered to before the use of specific therapy. The average duration of their illness before treatment was 3 days and 5.6 days after treatment. In this group the average total duration of the disease was 8.6 days. Sputum or nasal cultures were for the most part examined in this group, and include pneumonias caused by pneumococcus, streptococcus, staphylococcus, *B. influenzae* and mixtures of these bacteria. In this small group of 28 we found a case fatality rate of 18 per cent, which is practically the same as in the 1937-38 group under 2 years of age. In the 1938-39 group, 53 patients were treated with sulfapyridine in adequate doses. The average duration of the disease before treatment was 3.4 days and after treatment 3.3 days, or an average total duration of their disease of 6.7 days, which is a shorter course than the two previous groups treated by the usual non-specific methods. In this group treated with sulfapyridine the case fatality rate was reduced to 5.6 per cent.

In Table II it is readily seen that there were only a few patients in the group treated by usual methods and by sulfapyridine. It is noteworthy to observe that the average total duration of the disease in the non-specific treated

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† Working under a grant from the Banting Research Foundation.

‡ Type I Pneumococcus Rabbit Serum was kindly supplied by the Connaught Laboratories, University of Toronto.

group was 7.6 days as compared to 6.2 days in the sulfapyridine treated group.

In this group of patients aged from 2 to 14, the years 1937-38 and 1938-39 are compared. In the 1937-38 group cultures for the most part were not made. In the 1937-38 group 179 non-specifically treated patients showed a total average duration of their disease of 3 days before treatment and 5.4 days after treatment, or an

days. In the 1938-39 group 70 patients with pneumococcus pneumonia of the various types were treated with sulfapyridine. The average number of days was 3 before and 2.6 after treatment, a total of 5.6 days. In the group of patients with pneumonia from 2 to 14 years of age in 1937-38 the case fatality rate was 1.6 per cent. There were no deaths in the 2 to 14 year group in 1938-39, either in patients treated

TABLE I  
PNEUMONIA, UNDER 2 YEARS

YEAR	PATIENTS	DURATION OF DISEASE DAYS								TREATMENT	SPUTUM CULTURE	C.F. RATE
		1	2	3	4	5	6	7	8			
1937-38	112			3				7		ROUTINE	NOT DONE	20%
1938-39	28			3				5.6		ROUTINE	ALL BACTERIA	18%
1938-39	53			3.4				3.3		SP <sup>†</sup>	ALL BACTERIA	5.6%

\* refers to pneumonias caused by pneumococcus, streptococcus, staphylococcus, B. influenzae, and mixed cultures.

† SP = Sulfapyridine

▨ BEFORE TREATMENT

■ AFTER TREATMENT

TABLE II  
PNEUMOCOCCUS PNEUMONIA, UNDER 2 YEARS, 1938-39

PATIENTS	DURATION DAYS							TREATMENT	DEATHS
	1	2	3	4	5	6	7		
18			2.6		5			ROUTINE	4
35			3		3.2			SP*	1

▨ BEFORE TREATMENT

■ AFTER TREATMENT

\* SP = SULFAPYRIDINE

TABLE III  
PNEUMONIA, 2-14 YEARS

YEAR	PATIENTS	DURATION OF DISEASE DAYS								TREATMENT	SPUTUM CULTURE	C.F. RATE	BLOOD CULTURE
		1	2	3	4	5	6	7	8				
1937-38	179			3				5.4		ROUTINE	NOT DONE	1.6%	NOT DONE
1938-39	48			2.7				4.5		ROUTINE	PNEUMO- COCCUS	0	28- 20 SP <sup>†</sup>
1938-39	70			3				2.6		SP <sup>†</sup>	PNEUMO- COCCUS	0	62- 1- 7 SP <sup>†</sup>

\* 1.6% = 3 deaths in this group, 2 broncho-pneumonia, 1 Type 1 septicemia

† SP = Sulfapyridine

ND = Not done

▨ BEFORE TREATMENT

■ AFTER TREATMENT

TABLE IV  
TYPE I PNEUMOCOCCUS  
PNEUMONIA AND OPTERA, 2-14 YEARS

YEAR	CASES	DURATION OF DISEASE DAYS								TYPE OF TREATMENT	SPUTUM	B.C.	DEATHS
		1	2	3	4	5	6	7	8				
1937-38	38			3				6.4		ROUTINE	11	8-30 ND	2
1938-39	22			3				6		ROUTINE	7	17-4 ND	1*
1938-39	32			3				3		SP <sup>†</sup>	8	30-8 ND	0
1938-39	19			3				2		SP <sup>†</sup>	2	17-2 ND	0

\* = Blood cultures negative - Not done = ND

\* = Death due to bronchopneumonia

† SP = Sulfapyridine therapy

▨ BEFORE TREATMENT

■ AFTER TREATMENT

average total duration of 8.4 days. In 1938-39 pneumonia in patients from 2 to 14 years of age was caused by the pneumococcus of the various types in approximately 90 per cent of cases. There were so few patients with proved pneumonia caused by other bacteria that they have not been included in the 1938-39 group. In the 1938-39 group, 48 patients with pneumococcus pneumonia showed an average of 2.7 days before and 4.5 days after non-specific treatment, an average total duration of their disease of 7.2

by non-specific methods or in those in which sulfapyridine was used. In the 48 patients with pneumonia treated non-specifically in 1938-39, twenty-eight blood cultures were negative, and 20 were not done. In the 70 sulfapyridine-treated group, 62 blood cultures were negative, 1 positive, and 7 were not done.

In 1937-38, thirty-eight patients with Type I pneumococcus pneumonia showed an average duration of their disease of 3 days before non-specific treatment and 6.4 after treatment, a

total average duration of 9.4 days. In 1938-39, twenty-two patients with this type of pneumonia who were treated by non-specific methods showed an average of 3 days' duration of their disease before and 6 days' duration after treatment, an average total duration of 9 days. In the 1938-39 group, 32 patients with Type I pneumococcus pneumonia were treated with sulfapyridine in adequate doses. These patients showed an average duration of their disease of 3 days before and 3 days after treatment, or an average total duration of 6 days. In 1938-39, nineteen patients were treated with Type I pneumococcus rabbit serum by the continuous intravenous drip method. This group of patients had an average duration of their disease of 3 days prior to and 2 days after treatment, or an average total duration of 5 days. The numbers of patients developing empyema were as follows: non-specifically treated group, 1937-38, eleven out of 38 patients; non-specific treated group, 1938-39, seven out of 22 patients; sulfapyridine treated group, 1938-39, eight out of 32 patients; and the serum-treated group, 1938-39, two out of 19 patients. There were four immediate serum reactions in the serum treated group.

A review of the seasonal incidence of pneumonia in the two years reveals a slight rise in December of 1937 and a marked rise in the number of cases in June of 1938. In 1939, the main rise was in March with a smaller peak in May.

#### DISCUSSION

A few inferences are to be drawn from this report. In the first place, there is an appreciable difference between the case fatality rate in patients with pneumonia under 2 years of age and those with pneumonia between 2 to 14 years of age. In the group of patients under two years of age a reduction in the case fatality rate of 20 per cent in the non-specifically treated patients to 5.6 per cent in sulfapyridine treated patients is shown. In children between the ages

of 2 to 14 years deaths from pneumococcus pneumonia are unusual with any form of treatment when the disease is primary and uncomplicated. On the other hand, there is ample evidence that the duration of the disease has been markedly reduced by specific therapy. It is seen that patients with pneumonia under 2 years of age in whom sulfapyridine was used respond more rapidly to this method of treatment than to older methods, and that the case fatality rate is reduced.

#### SUMMARY

Sulfapyridine has reduced the case fatality rate in patients under 2 years of age with pneumonia caused by various bacteria from 20 per cent in those treated non-specifically to 5.6 per cent in those receiving the drug.

Sulfapyridine has shortened the course of pneumococcus pneumonia in patients between 2 to 14 years of age. Deaths in this age-group are unusual with any form of treatment, providing the case is uncomplicated.

Sulfapyridine, used separately, and Type I anti-pneumococcus rabbit serum, used separately, have shortened the course of pneumonia in children between 2 to 14 years of age suffering from Type I pneumococcus pneumonia.

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#### RÉSUMÉ

Chez les enfants de 0 à 14 ans traités pour pneumonie, spécifique ou non, de 1937 à 1940 à l'hôpital des Enfants-Malades de Toronto, 3 méthodes ont été employées: (1) la méthode qui n'utilise ni sérum ni sulfapyridine; (2) la sulfapyridine seule, et (3) la sérothérapie antipneumococcique du type no. I. Seuls les cas non compliqués sont rapportés. Chez les enfants âgés de 0 à 2 ans le taux de mortalité est tombé de 20 à 6 pour cent grâce à la sulfapyridine. Chez ceux compris entre les âges de 2 et 14 ans la mort est rare quel que soit le traitement, mais la sulfapyridine a nettement écourté la durée de la maladie. La sérothérapie antipneumococcique du type no. I agit aussi bien que la sulfapyridine et abrège autant la maladie. Les séries récentes (1938-39) ont bénéficié des examens de contrôle et des recherches bactériologiques complètes.

JEAN SAUCIER

According to statistics there has been a steady increase in the number of cases of mammary cancer for many years. For every eight women who in 1920 developed cancer of the breast, today there are eleven who do so, an increase of more than 35 per cent in twenty years. A part of this is due to the fact that there are a larger percentage of women today in the

age-groups that are most likely to have cancer, some of the apparent increase may be credited to accurate diagnosis. Reports are based on more careful medical findings now than ever before. However, there is an unexplained actual increase and that emphasizes the importance of alertness for symptoms that may mean the disease is present.



## THROMBOCYTOPENIC PURPURA\*

By LOUIS J. BRESLIN

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PETECHIAL hæmorrhage phenomena are, generally speaking, encountered in two groups of conditions: (1) thrombocytopenic states, either idiopathic or secondary, and (2) certain non-thrombocytopenic ones, such as purpura, aplastic anæmia, leukæmia, various septic and toxic states, and less often in pernicious anæmia, splenic anæmia, lipoid splenomegalies, benzol poisoning, etc. Such episodes may occur because of (1) allergy; (2) anoxæmic states; (3) toxins; (4) congenital weakness of the capillary wall; (5) vitamin C deficiency; (6) vitamin P deficiency; (7) disturbances in mechanism of blood coagulation, particularly with respect to the phase of thrombin formation. A reduction in the number of platelets is the outstanding feature, and the platelets may be large or small. Various investigators have ascribed the condition to disturbances of bone-marrow activity, replacement of megakaryocytes by other elements; others, to over rapid destruction of platelets in circulating blood, perhaps because of hypersplenism. Red blood cell formation is evidently not impaired, the major effect being due to stimulation of erythropoiesis because of hæmorrhage. Resistance of the red cells to isotonic solutions, although as a rule normal, is oftentimes increased, but may on the other hand be lessened. One usually for similar reasons encounters some degree of leucocytosis, although leucopenia may be present. The bone marrow is as a rule normal. Here, too, either increase or diminution of megakaryocytes may be seen.

This blood dyscrasia occurs at any age and in either sex. It is said, however, to be predominant among younger people, especially females. The mode of onset varies from acutely fulminant to extremely chronic. Usually there are spontaneous cycles of bleeding, clearing up only to recur after weeks to years. It is therefore impossible to prognosticate when purpuric manifestations are likely to disappear, and whether or not they will ever recur.

In addition to the low platelet count we can usually demonstrate prolongation of bleeding

time, delayed or absent clot retraction, a positive tourniquet test, prothrombin and clotting time are as a rule normal, but may occasionally be prolonged and exhibit so-called re-clotting phenomenon. Post-mortem there is nothing diagnostic to be seen except hæmorrhages into various organs of the body, rarely affecting the lungs. The following chart will I believe prove to be of assistance when considering a differential diagnosis of the commoner hæmorrhagic blood dyscrasias.

Various therapeutic measures to combat this condition have been advised. Apparent benefit, noticed at times, can in part at least be ascribed to the tendency of the disease to undergo spontaneous remissions. Multiple transfusion, to overcome the immediate ill effects of hæmorrhage and to much lesser extent to replace platelets is indicated. Splenectomy at a properly selected time is unquestionably the treatment of choice. This as a rule is followed by increase in platelets and cessation of hæmorrhage, the latter even when platelet count does not return to anywhere near normal levels. Snake venom in the hands of Rosenthal and his group would appear at times to be of some value. The following is a brief history protocol illustrative of the difficulties encountered in attempting to make a diagnosis.

## CASE REPORT

A.H., a white married male, aged 25 years, born in Ireland. For the past 8 years he had suffered from profuse spontaneous epistaxis, spontaneous eruptions of petechiæ all over the body. He volunteered the information that he would ooze blood for 15 to 30 minutes from the slightest cut or abrasions. Two years ago he underwent a nasal operation and almost bled to death. His family and past medical histories were otherwise unimportant. He was admitted to the medical service of the Mount Sinai Hospital on January 16, 1940, because of recurrence of this complaint; discharged in July, 1940.

Physical examination was essentially negative, revealing a very pale thin young male, lying comfortably in bed. The head, face, and neck region were normal except for a deformity of the nose (old fracture). Some fresh blood was seen in the naso-pharynx; nose, mouth and gums were pale, firm, but bleeding readily. Scattered all over the body were small discrete petechiæ, varying in size from a pin head to split pea. These were raised and could not be obliterated by pressure. Heart and lungs normal; blood pressure 100/60; pulse rate 70 to 80; temperature, normal. No adenopathy or splenomegaly, etc., was noted. The edge

\*From the Medical Division of the Mount Sinai Hospital, Toronto.



of the liver was just palpable. Red blood count, 1,450,000; hgb. (Sahli corrected) 36 per cent; colour-index 1.3; 1.5 per cent of reticulocytes were present; some anisocytosis, poikilocytosis, very occasional monocytes; lymphocytes 62 per cent; no immature cells seen. Bleeding-time varied from 6 to 16 minutes; clotting time 2 to 3 minutes. The tourniquet test was decidedly positive. Clot retraction was poor, van den Bergh 0.3 to 0.4. Urine, specific gravity 1.019;

cision because of troublesome phimosis, without exhibiting any undue bleeding. Blood count and haemoglobin stay at about 2.5 millions and 51 per cent; platelets 200,000 or over. Repeated examination of blood smears however fail to exhibit a reticulocyte response above 1.5 per cent; an occasional normoblast seen; white blood count, with two exceptions, has been 4,500 to 5,000. No premature cells noted; relative lymphocytosis present.

	<i>Hæmophilia</i>	<i>Thrombocytio purpura</i>	<i>Aplastic anæmia</i>	<i>Leukæmia leukæmia</i>	<i>Agranulocytosis</i>
Age .....	young	young	?	childhood	young
Sex .....	males (females transmit)	both sexes	both sexes	both sexes	both sexes
Anæmia .....	± to ++ after hæmorrhage	± to ++ after hæmorrhage	+++	+++	slight
Red blood cell activity .....	normal	normal to ++ (hæmorrhage)	poor or none	good	normal
Platelet count ...	normal	markedly decreased	decreased	decreased	normal
White blood cell activity .....	normal	+ or normal, occasional -	progressive de- crease, relative lymphocytosis	premature cells	no polymorpho- nuclears, relative lymphocytosis
Bone marrow remission ....	normal	normal - + after hæmorrhage	poor except with remission	active	few polymorpho- nuclears; may imitate leukæmia in remission
Bleeding time ...	normal, occasional +	+++	+	normal or +	normal
Coagulation time	+++	normal (occasional slight +)	at times pro- longed	at times pro- longed	normal
Clot retraction ..	normal	absent or delayed	normal to slight + or -	normal to slight + or -	normal
Tourniquet .....	absent	present	±	±	±
Prothrombin time	prolonged	normal	normal to slight +	normal to slight +	normal
Petechial .....	rare	+++ spon- taneous	++	++	+
Joint hæmor- rhages .....	common, especial- ly with trauma	rare	rare	±	absent
Splenomegaly ...	?	39% + 19% -	?	+	+
Adenopathy ....	none	none	none	tender	rarely
Angina .....	absent	absent	+	++	+
Fever .....	?	+ in acute cases	+	+++	+
Increase of van den Bergh.	±	± to -	+	+	±

free of albumin, sugar, red or white blood cells, casts; no urobilin present. The gastric contents showed the presence of free HCl. No melæna. Multiple transfusions were given by the indirect method; a high caloric anti-anæmic diet with ample vitamins was instituted, likewise ferrous salts, liver, etc. Despite an occasional rise of the red blood cells to 3,560,000, with hgb. to 55 per cent he continued to be much the same as upon the date of admission.

Two sternal punctures were done and disclosed a moderately active normal marrow, viz., normoblasts and a few erythroblasts, myelocytes and promyelocytes, mature red and white blood cells. Megakaryocytes appeared to be diminished in number but of mature form. Because of repeated recurrences of petechiæ and spontaneous hæmorrhages from the nose, and despite far from convincing evidence that this was a case of idiopathic thrombocytopenia purpura splenectomy was uneventfully performed on April 8, 1940. Histology of the organ thus removed revealed nothing pathognomonic of any specific condition. There was congestion of the spleen and hyperplasia of its follicles.

His course to date has been as follows. He feels stronger, and has with one exception been free from epistaxis and petechiæ. He recently underwent circum-

## DISCUSSION

The long duration of this condition, commencing in early youth, freedom so far as can be ascertained from exposure to benzol, radium, x-rays or other myelotoxic substances, periodic spontaneous recurrence of petechiæ and hæmorrhages, a persistently low platelet count in the absence of splenomegaly, accompanied by prolonged bleeding time, very poor clot retraction, positive tourniquet tests, normal clotting time, absence of premature cells in the peripheral blood, normal bone marrow, and now a tendency toward higher, and even normal platelet counts are findings in favour of the diagnosis of thrombocytopenic purpura. Low white blood counts are occasionally encountered in this condition.

The low level of regeneration of the other myeloid elements, *viz.*, low white blood cell, relative lymphocytosis, low red blood cell, reticulocyte counts and hæmoglobin count, make one strongly suspicious of an aplastic anæmia. The values thus obtained, although not consistent with the amount of bleeding, are stationary rather than progressively decreasing. Three bone-marrow examinations have to date failed

to substantiate or actually disprove this diagnosis.

The patient's improvement so far and almost total freedom from recurrences of petechiæ, etc., may merely be part of a spontaneous remission so common in this condition. Splenectomy has, apparently at least, done no harm. One will have to make further bone marrow and peripheral blood studies before reaching a positive diagnosis.

## SCHOOL HEALTH PROBLEMS\*

By LLOYD P. MACHAFFIE

*School Medical Officer, Ottawa Public Schools, Ottawa*

A MORE comprehensive heading for what I have to say today would be "School Health Problems and their Relationship to Pædiatricians and Family Physicians"; for in my opinion no school health service can function efficiently without the sympathetic co-operation of the medical fraternity.

I have been school medical officer for the Ottawa Public Schools for almost ten years. I have talked to various medical officers in Canada, the United States, and Great Britain and have studied numerous annual reports of school health services. It seems to me that all are faced with similar problems and difficulties. In case any of my audience are unconvinced that there should be health programs in the schools I might indicate some of the valuable services which they offer and which are not offered in any other way to the school-age child.

1. *Physical examinations.*—(a) Of the children coming from poorer homes: those on relief and the low-wage earners. If periodical physical examinations and inspections are advisable for all school children there must be school medical inspection. There are facilities for the examination and treatment of the poor sick child but not for the poor child with defects. (b) Of the children whose parents have the means to pay for medical attention. Many of these children receive annual or more frequent examinations, but defects may develop between visits to the doctor. Then, too, there are certain defects which are seldom looked for on these

visits. Many children, even from the well-to-do class, are not taken to the doctor unless they appear ill or below par. The insidious development of some illness or a potential illness-producing defect may be detected at the school examination, which when reported to the family doctor may result in the rapid correction of the underlying condition before severe damage is done, with little or no loss of school attendance and a financial saving.

2. *Environmental supervision and inspection.*—Lighting, sanitation, ventilation and heating need constant medical supervision. School boards must be impressed with the desirability and urgency of correcting defective conditions. School lighting is deplorably inadequate in most schools and may to a large extent account for the great prevalence of visual defects and eye-strain.

3. *Health education.*—The present trend is to leave more and more of the responsibility for this to the teaching staff. But the school medical officer and the nurses should act in an advisory capacity. They cannot escape the responsibility altogether; their opportunities of teaching health matters are too apparent. Parental education through home and school clubs, church organizations, service clubs, and the press should be adequately dealt with by the school medical officer. Health pamphlets and bulletins on current and pertinent health subjects should be distributed to the parents and teachers.

4. *Preventive medicine.*—(a) Vaccination and the giving of toxoid appear to be developing more and more into school projects in spite of

\* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Section of Pædiatrics, Toronto, June 21, 1940.

the desire of health and school authorities to place this responsibility on the family doctor and pædiatrician. Only where compulsory pre-school vaccination is enforced are school authorities relieved. Recently, in the City of Ottawa, the local health authorities held vaccination clinics in all elementary schools—public and separate; in our public schools 4,500 pupils were vaccinated. In spite of radio talks on vaccination, distribution of literature, and the presence of free facilities in the city health centres, only 12 to 15 per cent of our school population was vaccinated. School clinics turned out to be the solution. It is more than likely that when our figures have been finally analyzed they will show that 75 to 80 per cent of our pupils have been immunized to smallpox. The response to consent cards was surprisingly excellent, the way having been paved by a short but comprehensive press and radio campaign.

A very deplorable situation in respect to the incidence of diphtheria was present in Ottawa a few years ago. In spite of a fair amount of toxoiding by the family doctors, pædiatricians, and health clinics no headway was made until the institution of annual school toxoid clinics by the health department. I believe that problem has to be handled in a similar fashion in most communities.

(b) Inspections of pupils in classrooms and of pupils readmitted after illness, and the detection and exclusion of minor and major communicable disease and suspect scarlet-fever carriers constitute important features of the school health program. Without the closest surveillance by the school health services our schools would be great sources of contagion, in spite of the alertness of teachers.

5. *Dental clinics.*—The care of the teeth is one of the greatest problems with which Boards of Education are saddled. A great many of the children of those with means do not visit their dentist twice yearly, and preventive dentistry does not exist for the poorer children. The responsibility of detecting dental defects is usually that of the school nurses and the school medical officer, although school dental officers frequently make dental surveys. School Boards have had to establish dental clinics for poorer school children because no other authority will do so.

6. *Nutrition.*—The frequent weighing and measuring of school children, taken along with other factors, offers an extremely valuable check on the state of the nutrition and health of the child. This service cannot be obtained elsewhere. If the findings are properly interpreted along with proper follow-up—health talks to children and contacts with parents—considerable benefit will accrue to the children.

#### WHAT A SCHOOL HEALTH SERVICE DOES NOT DO

It does not attempt medical treatment other than the giving of first-aid treatment to minor cuts, abrasions, burns and bruises, etc. Sometimes school health services have found it necessary, however, much to their dislike, to treat scabies and pediculosis. Parents are notified by letter or by personal contact of any encountered defect and advised to consult their physicians. The school examination, although frequently called complete, is nevertheless far from such. Tuberculin, blood and urine tests are only rarely performed. The child's physician or hospital clinic must complete the examination.

#### HOW MAY THE CHILD'S PHYSICIAN CO-OPERATE?

(a) Assume a greater degree of responsibility in respect to all recognized proved methods of immunization—definitely pre-school procedures.

(b) When periodical examinations are made by the family physician or pædiatrician might I humbly suggest that vision and hearing tests constitute part of the examination? These will yield a rich harvest. Might I also suggest that a greater interest be taken in static foot conditions? They are very prevalent.

(c) I should like to see iodine administration for the prevention of juvenile goitre as much a part of the physician's stock-in-trade as cod liver oil and orange juice.

(d) Might I also suggest that sick children be not given weak tea to drink? Teachers, school medical officers and nurses spend hours every week teaching children the value of drinking milk. Coffee and tea drinking, to the exclusion of milk, is one of our greatest problems, and, along with late hours of retiring, is a prime cause of failure to gain in weight.

(e) Physicians could be of great assistance if they refused to issue medical certificates for children to return to school after absence with communicable disease unless they have seen the

child, and also if they refused to issue certificates on the basis of statements made by the parents. I regret to state that this is a not uncommon or localized practice. German measles may sometimes be scarlet-fever; hives, very frequently chicken-pox; and glands in the neck, mumps, etc.

Schools with modern up-to-date school health services and alert teachers give a tremendous amount of time and labour to contagious disease control. Parental co-operation is poor, but very critical; medical co-operation is far from ideal. A public health-conscious medical fraternity would be desirable.

### THE PRE-SCHOOL CHILD

I should like to make a few remarks about the child of this age-group. The opinion of school medical officers the world over is that many of the pronounced defects which handicap children in their school work had their onset prior to the children's entry into school. Meticulous care is offered in most communities to all infants and to school children, but there is an alarming hiatus as affecting the pre-school child—a gap which remains open until the school period arrives when medical inspection gathers the "forgotten child" under its wing and endeavours to cope with its health problems. All through the school period special classes have to be devised for many of these children with heart, hearing, visual and crippling defects; many non-remedial defects have developed, such as permanent deafness from the neglected suppurating ear and earache, or loss of sight in one eye from parental complacency in regard to squint.

### WHAT IS THE SOLUTION?

Firstly, increased free clinical facilities for continuous medical supervision from birth to the school period. Secondly, parental education by alert and well informed medical opinion, aimed to overcome that dangerous triad of apathy, indifference, and ignorance shown by so many parents. Parents must be made to realize that while Johnny is outgrowing rheumatism he may be developing heart disease; while outgrowing squint he may be growing blind; and while outgrowing earache or "bealing" ears he may be growing deaf—and so on *ad infinitum* with the pathetic story.

This attitude of *laissez faire* is responsible for much preventable ill health, future suffering and expense, for the health of to-day's child determines in a large measure the health of tomorrow's adult and the citizen of the future.

### RÉSUMÉ

Les écoles devraient avoir des programmes de santé. L'examen physique périodique peut corriger et guérir des petites déficiences avant qu'elles deviennent permanentes ou incurables. L'école et le milieu familial doivent être étudiés et améliorés s'il y a lieu. On doit enseigner les principes sanitaires. Les enfants sont déjà vaccinés contre quelques maladies, mais on doit les éclairer ainsi que leurs parents sur toutes les maladies évitables. Le dentiste devrait voir tous les écoliers deux fois par année. Il est facile de les peser et de mesurer leur taille régulièrement. Il est aussi facile de généraliser à l'examen du sang et des urines et de faire l'épreuve à la tuberculine. La collaboration entière du milieu familial est indispensable aussi bien pour l'écolier que pour l'enfant qui ne va pas-encore à l'école. Pour faciliter la solution du problème il faut multiplier les examens préscolaires, éduquer les parents et lutter contre la tendance au moindre effort.

JEAN SAUCIER

Skim-milk, perhaps because of a popular old advertisement, is a rather opprobrious term, and the prejudice against this product in America is such that according to the U.S. Department of Agriculture only about 12 per cent of the skim-milk produced is used in the manufacture of dairy products. In a paper by Mr. J. S. Abbott at the sixty-ninth annual meeting of the American Public Health Association it was urged that the misuse of skim-milk constitutes an enormous economic waste. It contains all the essentials of whole milk except the milk fat and fat-soluble vitamins, and it even contains a certain amount of each of these, though not so much as whole milk. The Nutrition Committee of the League of Nations stated that, pint for pint, skim-milk

contains more calcium, phosphorus, iron, and protein (though, of course, fewer calories) than whole milk, and is much cheaper. It is a good foodstuff for animals, but to feed it to pigs is unsound economics because it requires 10 pounds of the food nutrients in skim-milk to produce 1 pound of food nutrients in the form of pork. Industry and legislative effort to create a market for this wholesome foodstuff, says the author of the American paper, would be in the interest of consumers and dairy farmers alike, and there ought not to be any restrictions or discriminations against compounding skim-milk with other foodstuffs for use as human food in the manufacture of food products that supply a want of the people and that can be produced economically to advantage.—*Brit. M. J.*, 1941, 1: 51.

## THE OVERWEIGHT CHILD\*

BY LIONEL M. LINDSAY

*Montreal*

IN a pædiatric practice many children are encountered whose chief complaint is that of being considerably overweight. Often this condition of the child is accepted by the parents as a sign of good health and digestion, and indeed the child may appear so robust and cheerful that any criticism of his weight is resented.

On the other hand, some children are brought to their physician because obesity is the cause of a definite handicap, mental or physical. They may be taunted by their companions until they become acutely sensitive of their appearance, or they are unable to participate in games, and so become less active and still heavier. The overweight girl may realize that she is not as attractive as her more slender companions. These effects may in time lead to definite personality changes or behaviour problems which may be detrimental to the whole future of the individual. Fortunately, such an eventuality is not the rule, for many obese children will assume a more normal configuration as adolescence advances, and many are cheerful in spite of their weight.

For practical purposes, any child may be considered overweight who is more than 20 per cent above the average weight for age, height and sex when compared with standard tables. All grades may be seen, even to those who are double their expected weight. Some observers claim that obesity may be gauged more accurately by clinical inspection than by height and weight tables, for then the distribution of fat and general physique may be taken into consideration.

It is generally assumed that the increase in weight of this type of child is due largely to an increase of adipose tissue. This is not always the case. Overweight children are frequently above the average in height. Their bones appear to be larger, and it has been shown that their weight is due as much to increase in muscle as to fat. Sexual development occurs somewhat earlier than in the average child.

In short, the overweight child is often bigger and stronger than his slimmer companion. But the greater strength is sometimes counteracted by the greater load he has to carry, and so he may become somewhat cumbersome or complain of a variety of symptoms, such as dyspnoea, flat feet, or pains in the back or legs. Such symptoms would make the child less active, and so a vicious circle is established. He becomes indolent and lazy, and so heavier. But generally speaking stout children are particularly cheerful and bright and their round, rosy faces are a pleasure to behold.

The onset of obesity may be quite rapid, beginning usually when the child is between 8 and 12 years of age. Sometimes the onset dates from an illness or operation, at other times it develops more insidiously. The cause may be difficult to ascertain, and the pathogenesis is uncertain. Heredity is a very definite factor. Often one or both parents is decidedly large or obese and the offspring may be strikingly large, even in early childhood. Such children may have an abnormally large appetite, especially for carbohydrates, but this in itself does not necessarily lead to obesity. Many a "skinny" child will consume a comparable amount of food without noticeably increasing his weight.

When the obesity appears to be caused by overeating or lack of exercise it is said to be of exogenous origin. When it occurs as a constitutional abnormality, (probably hormonal) it is designated as endogenous. Authorities on the subject differ widely in their opinions regarding the relative importance of these two causes.

It would seem that while some overweight children fall definitely into the exogenous category, and some are obviously the victims of endocrine disturbance, the majority may be grouped between these two extremes. All are the result of a peculiar metabolism, which in the last analysis is probably governed by glandular action. This would seem to account for the tendency of boys and girls to put on excess weight at the time of puberty, and later,

\* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Section of Pædiatrics, Toronto, June 19, 1940.

as the glands become harmonized, the adolescent assumes more normal proportions.

It has humorously been suggested that the obese child may be classified as, the enviable, the comical, and the pitiable. Obviously those in the first class would require no treatment. The others require some consideration. The fat boy in "Piekwiek" might be considered both comical and pitiable.

It is necessary then before undertaking treatment to consider the individual case in all its aspects. The heredity and physique of the child's forebears indicate the child's possible tendencies. The eating habits of the child must be ascertained, especially in regard to the nature of the foods which he likes and dislikes and his habit of eating between meals. An estimate of the amount of exercise he takes is also necessary. The age of onset of his obesity and the manner of its development may suggest a clue to its underlying cause.

The physical examination will reveal the child's general physique, the distribution of fat, the texture of his skin and hair, and the sexual development. If the condition seems to warrant further investigation one may require a basal metabolic rate, x-ray films of the sella turcica and centres of ossification. A determination of the sugar tolerance, specific dynamic action, and the creatinine coefficient may also be required. Yet it is surprising how seldom one finds any abnormality by these tests.

However, by such means a certain number of cases will be found which can be classed as due to endocrine dysfunction. One must bear in mind that the basal metabolism rate of the overweight child cannot be measured by the same standards as the average child. The most accurate readings are perhaps obtained when computed on the basis of height rather than on the usual surface area.

Hypofunction of the thyroid or the pituitary gland are by far the commonest disturbances which lead to obesity of more or less characteristic type. The term Fröhlich's syndrome, or dystrophia adiposo-genitalis, is rather loosely used to designate an overweight child with particularly small genitals. True instances of this are not common. The syndrome is probably caused by some lesion in the hypothalamus associated with impaired function of the hypophysis. Occasionally one encounters obesity resulting from tumours or hypertrophy

of the adrenal cortex or of the gonads. Other glandular disturbances may be associated with these and the pattern becomes intricate.

Before advocating treatment still other things must be taken into consideration. In the first place, if the child is strong and healthy, and is not concerned with his or her appearance, and not suffering from any complaint that might be attributed to his weight, it would seem advisable to be conservative and to keep the case under observation. Natural growth and development may bring about an amelioration of his condition with the minimum of interference. But if normal activity is hampered, and the child complains of dyspnoea, pains in his legs and feet, and, particularly, if he is sensitive about his appearance, some effort should be made to improve the condition. The importance of the psychological factors in this regard have been stressed by Dr. Brueh, of New York. The child often resorts to eating as a solace to his wounded pride or handicap in not being able to compete with his fellows.

The first essential in the treatment is to secure the co-operation of both parent and child. Without this one can hope to accomplish little. Eating is a pleasant pastime which may become pathological. The indulgent mother may develop in her child the habit of stuffing himself with ice cream and cake at all times of the day. To break this habit will be a real struggle. The child should be protected from the temptations of the pantry. Tact will be necessary and the child may be allowed an apple or pear between meals in order to appease his appetite. It is understood that lapses from grace are apt to occur and must be condoned.

Whether the obesity is considered as due to exogenous causes or endocrine disturbance, reduction in the amount of food consumed will produce a loss of weight. Discretion must be exercised in restricting the diet of children, especially at the period of rapid growth and development, when normally large quantities of food are consumed. It would be unwise and perhaps detrimental to advise any drastic cut in calories at this time. But the total calories may be considerably reduced by limiting the consumption of fats and carbohydrates, provided a liberal amount of protein and green vegetables is allowed. These not only satisfy the appetite but also supply the physiological needs of the patient. Moreover a high protein diet tends to stimulate metabolism and thus prevents the

storage of fat. There is a tendency in obesity for the tissues to hold an abnormal amount of water, and so it would seem rational to restrict the quantity of water and salt consumed by the patient.

General rules for the regulation of the diet are usually sufficient, at least in beginning treatment. The following have been found satisfactory.

Do not eat: fried food, sausages, pork, salt fish, cake, candy, jam, syrup, ice cream, pastry.

Eat small quantities of bread, potato and butter. Eat largely of green vegetables, salads and fresh fruits, lean meat, cheese and fish. Take 30 ounces of milk daily, but no cream. Buttermilk or skimmed milk is sometimes preferable. Take only one small glass, (six ounces) of water before or during the meal. No table salt should be added at meals. Additional fat-soluble vitamins should be given.

If these instructions are carefully followed and do not bring about an improvement a more specific diet providing for 1,500 or 2,000 calories may be prescribed. By such means a stationary or even reduced weight will produce the desired results, for the child will continue to grow in height and so assume more graceful proportions. The importance of an adequate amount of protein, calcium and vitamin D at puberty must be stressed. The development of slipped epiphysis and epiphysiolysis at this age has been attributed at least in part to an insufficiency of these elements in the diet.

Secondly. Increased activity should be encouraged, beginning with gentle exercises and increasing in proportion to the child's tolerance. Swimming and bicycling are perhaps two of the most suitable forms of exercise for those children whose weight definitely hampers their movements.

Some of these patients may be indolent and lazy, and may require a certain amount of urging to keep at their exercises. They may

be discouraged by their lack of skill and success in games and by the derision of their playmates. To these small doses of benzedrine sulphate may be given with benefit. This drug not only stimulates physical activity but is said to have a definite effect in depressing the appetite. Small doses may be given once or twice daily, preferably in the forenoon.

Perhaps the most widely used remedy for reducing weight is thyroid extract, irrespective of whether there are signs of hypothyroidism or not. Thyroid does increase the rate of cell oxidation and so burns up fat. It also tends to withdraw water from the system. Usually it has very little effect in raising the basal metabolic rate in cases which are not frankly myxœdematous. Nevertheless, small doses under controlled conditions can be given, certainly without harm, and often with benefit, especially at puberty.

Pituitary preparations have their advocates, but the accredited results are not always convincing. Given by mouth, they have little effect, while the trouble and expense of giving them hypodermically is only justified under very exceptional circumstances.

In conclusion it must be admitted that the treatment for the overweight child, as outlined above, does not change the constitution of the patient nor correct a disturbance in the endocrine system and so can only be said to be palliative. Nevertheless, if carried out consistently, it will alleviate the condition to some extent until such time as nature can establish a more normal balance of the fat regulating mechanism. It will also tend to prevent the development of psychological problems and of mechanical disabilities during the vulnerable period of adolescence.

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**POWDER ON GLOVES RESPONSIBLE FOR ILLNESS.**—Serious complications and illness may follow operations if talcum powder from the surgeon's gloves gets into the surgical wound. Drs. Edward J. McCormick and Thomas L. Ramsey report two cases of post-operative complications in which second operations were required, one of them resulting in the loss of the child-bearing organs in a 21-year-old woman. In both cases crystals of magnesium silicate, or talc, were found in the inflamed

tissues removed at the second operations. It is probable that many other cases of post-operative complications caused by talcum or by lycopodium powder have gone undiagnosed in the past. Careful washing of the gloved hands of the surgeon and his assistants, to remove the powder used on the gloves, and care to keep the air of the operating room free of the powder are urged to prevent such complications.—*Science News Letter*, March 15, 1941.



## Case Reports

### A CASE OF RUBEOLA DURING THE PUERPERIUM

By M. LERNER

*Cut Knife, Sask.*

I am reporting this case of measles during the puerperium because of its rarity and the successful treatment of this serious association.

Mrs. W.R., aged 20, para-i, grav-ii, was admitted to the Cut Knife Municipal Hospital on October 20, 1940, at about 4.30 p.m. She was having labour pains at 5 minute intervals, and complained of having a "cold", and a dry hacking cough. There being a measles epidemic in the district, she was questioned, and admitted that she was a contact and that she had not had the disease previously.

The labour was normal and she was delivered of a male child weighing 8 pounds. The patient and baby were isolated.

The following morning, October 21st, on examination, Koplik spots were seen on the buccal mucous membrane. The patient was given 20 c.c. of her husband's blood intramuscularly, the latter having had measles some ten years before. The baby also received 20 c.c. of blood from the same donor into the gluteal region. The baby was taken off the breast and separately isolated. That day the patient's cough became worse and her temperature rose to 102° at 4 p.m.

On October 22nd a rash appeared, typical in type and distribution. The patient was miserable, and the temperature climbed to 103°. She was given, in addition to the usual prescribed treatment, prontosin, gr. 10, Nalico, gr. 10, and methylene blue, gr. 1, O.I.S.

On October 23rd the rash had appeared all over her body, and while abundant on the upper half the spots were scarce on her lower limbs. Her eyes were extremely painful, but her temperature had dropped to normal.

The following day her temperature rose to but 99.4°, dropped to normal on the next, and remained there until the day of her discharge, October 31, 1940. The rash began to fade on October 24th and was completely gone by the 26th.

The baby showed no signs of illness or rash and 3 weeks after birth there is no evidence of measles.

I believe that the blood injection, though given late, modified the course of the disease in the case of the mother and prevented it in the baby. The prontosin no doubt prevented secondary infection from setting in.

### TREATMENT FOR DERMATITIS VENENATA

By K. A. BAIRD

*West Saint John, N.B.*

Even four swallows "do not make a summer", nor do four cases prove the value of a treatment, but the following case histories seem to suggest a useful line of treatment for poison ivy dermatitis, especially in view of the paucity of the

information given in any books the writer has been able to consult.

R.H., female, aged 20.

Complaint.—Blistering on the right buttock said to have been caused by poison ivy. She had been getting a typical allergic reaction to something in various parts of the body for the last two weeks since contact occurred. Now she had a rash on one thigh which gave a burning sensation. The patient was given 10 c.c. of 10 per cent calcium glucono-galacto-gluconate\* intravenously. The rash on the thigh faded in a few minutes and the discomfort was relieved. She was given prescriptions for ephedrine hydrochloride (gr. ½) and calcium gluconate, to take orally if symptoms returned. She reported later that the condition did not return.

G.H., a male, aged about 21.

This young man was working around poison ivy four days before and got a severe dermatitis on face, arms, hands, legs, etc. He continued to react severely and the rash "burned" very much at times. He was given 10 c.c. of 10 per cent calcium glucono-galacto-gluconate intravenously. The patient fainted briefly from psychosis as he had never "had the needle" before. He recovered promptly from the faint and said he was relieved of the burning sensation. The rash paled somewhat. He was given prescriptions for calcium gluconate, ephedrine hydrochloride tablets, and a soothing ointment. He promised to return if not definitely better, but he did not return.

R.W., a male, aged about 58.

Complaint.—Pain and swelling of both eyelids and tissues, and blebs over the left side of the forehead.

History.—The fact that this man had psoriasis on his arms and abdomen for the last ten years does not seem to have any bearing on the present case. Eight days ago his forehead broke out in a pimply rash. The area was very tender. It started at the outer margin of the left eye and extended up over his forehead. Three days later his left eye was closed and the swelling had spread to the right eye and down the left side of the face. The affected area was very sore and throbbing. Eight days after the initial lesion, the appearance was that of an allergic reaction rather than herpes, and was still smarting and stinging, but he said he felt somewhat better. The patient attributed his trouble to flies (which were thick) or to some plants with which he came in contact while working around with weeds. He was admitted to hospital. His temperature was 101° on the evening of the day of admission, but otherwise remained within normal limits. He was given calcium intravenously on three consecutive days as well as calcium lactate (gr. 10 t.i.d.). The condition rapidly improved, the swelling subsided, and the rash dried and disappeared in three or four days.

G.A., a druggist, came to the office with an acute dermatitis on both hands and forehead. His arms and hands were noticeably swollen, and he said that they felt tight when his fingers were flexed. He attributed the condition to exposure to poison ivy four days before. He had been treating the area himself by frequent applications of Dakin's solution and tincture of iron. He was given 10 c.c. of calcium glucono-galacto-gluconate intravenously. Within a few minutes he reported that his hands felt less swollen. He was advised to take calcium gluconate by mouth, and he was to take ½ gr. of ephedrine if any severe symptoms developed. The condition continued to improve rapidly, the red rash fading and the swelling being reduced. Within two or three days the patient considered himself cured.

\* Calcium glucono-galacto-gluconate "Calcium Sandoz" is the new formula prepared by Sandoz Laboratories.



## Editorial

### PEPTIC ULCER—THE MAJOR DISABILITY OF WARTIME

AN epigram attributed to the Emperor the First runs thus: "An army marches on its stomach." This pronouncement is as true today as it was then, though it has now a connotation different from that in the mind of the great conqueror. Then it had reference to the importance of maintaining communications; now it concerns the gastrointestinal tract of the personnel. Of late it has become increasingly evident that disorders of the alimentary tract—peptic ulcer in particular—must be regarded as the major medical disability of wartime.

So frequent were the ulcer cases during the early months of the war that a Commission was appointed in Britain under the auspices of the the Leverhulme Fund of the Royal College of Physicians to investigate the subject. During the period that elapsed between the dispatch of the first troops of the British Expeditionary Force to France and April 29th, 1940, of all the cases evacuated to the United Kingdom 12.5 per cent carried a primary diagnosis of gastric or duodenal disease. If the emergency evacuations of the base hospitals were excluded, since even those with minor illnesses were sent home, the figure rose to 14.4 per cent.<sup>1</sup>

This matter concerns us here in Canada, for many of our men are now returning, invalided out of the service, and we are informed on excellent authority that the proportion of peptic ulcer cases among them is surprisingly high.

According to the study of the situation by the Commission above referred to the cases of digestive upset could be placed in four categories—malingering, neuroses, gastritis, and peptic ulcer. The correct diagnosis is highly important, but, obviously, not easy. It has been advised by Sir Arthur Hurst that special hospitals be set up, staffed by specialists in gastroenterology, who would make the diagnoses on scientific principles. We have not reached that point yet in Canada, however.

It is not pertinent to our purpose to discuss

the pathological problems involved in the production of peptic ulcer, but we will refer to certain of the etiological factors which, though of a secondary nature in the evolution of the condition, are of prime importance in our present problem. They are: family idiosyncrasy, unsuitable food, overwork, and worry. If these factors are operative under peace conditions, as we believe they are, their action will, we would expect, be intensified under the exigencies of war service.

In the opinion of the Commission the most important single factor in the causation of peptic ulcer is the change from the selected diet of home to the rigid routine of the army ration. They noted, too, that 38 per cent of the ulcer patients had teeth inadequate for their task, though only 15 per cent gave evidence of dental sepsis. Further, it is important to note that in nearly every case the man had had his ulcer *before* the war. When at home under ordinary conditions the would-be recruit has been able to select his diet to suit his needs; in the army he cannot do so. At home he can rest when he feels like it; in the army he may be exercised beyond his limit of endurance. At home his worries can sometimes be avoided or lessened; in the army they are unavoidable and more intense.

Elsewhere in this issue (p. 525) can be found a Table furnished by Major-General LaFlèche, of the National War Services Department, which gives us illuminating statistics as to the prevalence of the various disabilities found on the examination of applicants for admission to military service. The figures are based on the records of 10,000 men. As might be expected the chief disability was defective vision, necessitating the use of glasses—14.14 per cent; stomach and intestinal disorders, among which, no doubt, peptic ulcer is included, second highest on the list—8.44; foot troubles—8.36. This second figure will help to support the thesis that peptic ulcer is common in peace time as well as in war time. It is gratifying to note, however, that tuberculosis is not common among the

1. PAYNE, R. T. AND NEWMAN, C.: Interim report on dyspepsia in the army, *Brit. M. J.*, 1940, 2: 819.

applicants—0.74 per cent. We are not told what percentage had defective teeth, but 3.52 wore dentures.

The moral of all this, is, of course, that every effort should be made to avoid enlisting men with peptic ulcers. Under the conditions of the preliminary routine examination it is easy to miss these cases. We may have to deal with the man who minimizes his symptoms in his eagerness to be accepted; and we, on the other hand, may meet the man who in his desire to escape enlistment gives a fake history or exaggerates the symptoms he has. Generally-speaking, if the candidate has had severe symptoms he will have been referred by his

doctor to some hospital for x-ray examination, and it should be possible to get a report on his condition. And once an ulcer, always an ulcer!

This matter of peptic ulcer is of sufficient importance to call for a definite course of action and concerted action. The time for the detection of peptic ulcer is before the candidate enlists. A soldier with peptic ulcer is of no value from a military point of view. Rather, he is a liability. He might, as a civilian, be of use in an occupation more suited to his capabilities. The importance of peptic ulcer from a pension aspect is, of course, self-evident.

A.G.N.

## Editorial Comments

David Low, M.D., F.R.C.S.(C)

We regret to have to record the death of Dr. David Low, of Regina, which occurred on March 9, 1941.

Dr. Low was a Past-president of our Association (1925-1926) and held office at the Regina and Victoria meetings. This latter gathering was notable in that many enterprises of interest to medical men were broached and some were advanced a stage—foundation work which was well conceived, and well carried out, conducing greatly to the usefulness of our Association in subsequent years. Dr. Low was active in all that pertained to our welfare. He was particularly interested in the establishment of the Royal College of Physicians and Surgeons of Canada, and, as chairman of the Association's committee on the subject, was very active in making the proposal an actuality in 1927. He held, and rightly, that an examining body of this nature would be of great value in maintaining and indeed enhancing the standards of medical education in Canada. As an "elder statesman" in his city, he was looked up to for guidance, and was identified with many good works, notably the establishment of a modern hospital and the campaign against cancer. He has left a good record behind him and will be greatly missed.

A.G.N.

### War Medicine\*

The first number of a new journal is before us. While it is a "new journal" it is not just "another journal". Its *raison d'être* is sufficient and its appearance timely.

A number of journals on war and aviation medicine are, of course, well known, but this

one is welcome as it covers a much wider field than the others and bids fair to acquaint us with all phases of the medical and administrative war effort in the United States. The new journal is edited by the Committee on Information, National Research Council, in collaboration with the American Medical Association. Dr. Morris Fishbein is Chief Editor.

It will be admitted by all that the problems which arise in connection with the medical training and care of troops on land and sea and in the air are speedily becoming highly specialized and that the average doctor does not know and cannot be expected to know as yet all the points that make for greater efficiency in the service which he renders. His job is primarily to save life, and the wider his knowledge, the more efficient his work. It was recognized that co-operation was required in deciding upon the standardization of medical procedures and in the securing of adequate personnel, and, at the same time, that such efforts should be adequately reported. The Committee selected to publicize these efforts is composed of specialists in their various fields. It is hoped to develop a bank of information concerning physicians available for the Army in all its branches, for the Navy, and for industry and public health work, in particular. The table of contents for this first number is as follows.

Industrial Hygiene and the Navy in National Defence, E. W. Brown; Benzadrine Sulphate, A. C. Ivy and L. R. Krasno; Aviation Medicine in the United States Navy, F. Ceres; March Fracture, P. L. Moore and A. N. Bracher. Various Official Statements; Abstracts from Current Literature; Book Reviews.

This journal promises to be of use to a widening circle and deserves a cordial reception.

A.G.N.

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## Men and Books

### PARACELSUS\*

By E. P. SCARLETT

Calgary

#### I.

I appreciate very deeply the honour of being invited to speak to the Academy on the occasion of its annual historical night. It is always a pleasure to return to one's Alma Mater, to revive, "clad in the sober russet of middle life", the emotions and hopes of bright-coloured student days, and to ponder that eternal delightful enigma of all university men—What is it about one's university that colours the whole of the rest of life? It is a particular pleasure to re-visit this Academy, for here as a student I first discovered that modern colossus of learning, a medical library. I remember how in those blessed hours of student life, the long afternoons off, I struggled through medical books and periodicals, looking for simplicity and truth in medicine, and how bewildered I was when I failed to find them. I still use this library, through the kindly offices of Miss Poole, and, alas! I must confess that I still struggle through the books that come to me from this medical Alexandria of the east, and in my western fastness I am still at times bewildered and still as often as not fail in the quest for simplicity and truth in medicine. Nevertheless it gives me pleasure to speak here tonight if only in a small measure to pay homage to the spirit and traditions of this Academy and its library.

Over the doorway of the library in a certain quiet cathedral city in England is this inscription *ΨΥΧΗΣ ΙΑΤΡΕΙΟΝ* which in the vernacular may be rendered "The Dispensary of the Soul". This has always seemed to me an ideal motto for the physician's library. It blends the historical and the scientific spirit in that humanism which is the inner essence and the glory of our craft. I commend it to this library.

\* \* \*

The late Sir Walter Raleigh wrote thus of the Renaissance:

"That great movement of the mind of man brought with it the exhilaration of an untried freedom and the zest of unlimited experiment; but it took the human soul from its station in a balanced and rounded scheme of things, to deliver it over to every kind of danger and excess. . . . From his servant's estate in the great polity [of Catholic theology], man was released by the Renaissance, and became his own master in chaos, free to design and build and inhabit for himself. The enormous nature of the task, which after three centuries is still hardly begun, did not at first oppress him; he was like a child out of school, trying his strength and

resource in all kinds of fantastic and extravagant attempts."

The man whom we are to consider this evening was, to use Raleigh's fine phrase, "a master in chaos". It is precisely because Paracelsus was like a child out of school and because of his "fantastic and extravagant" thought and speech that his name has come down to us today. But he was agonized by many of the same issues as ours today, living as he did in that disturbed and disillusioning period when the Renaissance passed over into the Reformation and the religious wars. He lived during a very significant turning of the ways in Europe, much as we are experiencing in our own time. It is fitting then that we should call him to mind in this four hundredth year from his death.

I fully realize that at the present moment, when it is so difficult to think of anything but of what is and what will be, circumstances debar us from practising that rarest and most valuable of the intellectual virtues, a true detachment. We have virtually been forced to give up thinking about the things that most truly concern us; we cannot proceed, for we are engaged in a struggle that is all-consuming. In the rapid whirl of events we have seen with our own eyes the apparent shipwreck of a morality and a religion in which, for all our scepticism, we obscurely trusted. We have watched a whole social order disappear into the deeps. We have watched with numbed senses the visible and material symbols of the past blown into dust. We are in the worst situation that the British people has had to face since the Dark Ages. We may have been thoughtless sentimentalists before the disaster; we are now cast as heroes in a tragedy. On such a scene for some one to come along and wish to discuss the figure of a man of four hundred years ago seems like presumption and futility. The speaker is apt to be regarded either as a Lucretian spectator of the misery of man or as a foolish idle dreamer.

And yet these very circumstances, with the world again in turmoil, should heighten our interest in Paracelsus who acted as a kind of catalytic agent upon the conflicting elements in a disturbed civilization. The great historical revolt which began in his time is still working itself out. We cannot escape from our past and least of all from those fundamentals with which the Renaissance period was concerned. As F. S. Oliver, one of the great political thinkers of our time, has written:

"Our obligation to the sixteenth and eighteenth centuries is not cancelled or diminished because the nineteenth, wearied by a struggle that was nearly fatal, fell asleep and awoke again to find itself in a heaven of material prosperity which it mistook during fifty years for the millennium. We are still burdened with the honour of the stewardship. The nature of our duty has changed, but the duty itself is plain."

\* An address delivered at the Stated Meeting, Library and Historical Night, Academy of Medicine, Toronto, January 7, 1941, in commemoration of the 400th anniversary of his death, September 24, 1541.

Our generation, I think, is at last engaged in the full and arduous discharge of that duty.

But you say that Paracelsus is at best a dusty tiresome figure. To the intellect of our time wild figures of his type seem to be the very crown and flower of futility; they are collectors of straws, and, for all their violence, misers of dust. And besides, Paracelsus was a philosopher, and "how tiresome are the one-eyed philosophies!" Above all he was mediæval! I may gently counter that Paracelsus is too often passed off with that word "mediæval" which among us has come to be used as a term of abuse. To be mediæval is not to be cast into outer darkness. We moderns are too prone to underrate the mediæval vision and sneer at the Schoolmen. But even if Paracelsus was essentially a man of the mediæval period, like certain other rebellious spirits, he liked to warm himself at fantastic fires, and on occasion he blundered into the speech of modern empiricism.

The first thing to do in the consideration of a complex and versatile genius is, if possible, to separate the man and his "legend", for every great man has his legend, the result of the impact of his personality on his time. In the case of Paracelsus this is an imperative but profoundly difficult task. He has always been and still is a semi-legendary figure. A mass of literature clusters round his name. Dark legends have hung cobwebs round the essential figure of the man. In sharp contrast to the qualities of his contemporaries—the superb detachment of Leonardo and the sombre passion of Michelangelo—he is a strangely mixed character behind whose swaggering periods of speech broods a mind which takes a dark pleasure in shattering the established forms of the time. The result has been that he has achieved a strange renown.

Now critical opinion must deal with this phenomenon. To be worth anything medical history must be more than the pious celebration of some ancient benefactor of our craft, a sort of sentimental ancestor worship. It is pleasant to record that medical historians have been busy with the separating of myth from fact in the life of Paracelsus. Not until the last century was he given his due place in medical history. To the work of many German scholars, and in particular to the monumental labours of that master of the historical craft, Karl Sudhoff, we are indebted for a better understanding of the personality and accomplishments of the eccentric genius who was Paracelsus.

I trust that I shall have due respect for these materials, and not slip into the besetting sin of so many modern impressionistic biographers. Their regard for the historical verities recalls the experience of a friend of mine who, while walking on one of the roads near Lexington, read a sign posted on a tree in the front yard of a farm-house. The sign read: "This is the original house at which Paul Revere would have stopped if he had ridden this way."

\* \* \*

The life of Paracelsus swings through the glowing orbit of wayward genius. We shall plot it briefly, keeping in mind that everything concerning this man has been disputed at some time or another. He was born on December 7, 1493, in Einsiedeln, Switzerland, a village near the city of Zurich, which at the time was part of the German confederacy. So far as we know, he was an only child. His father, William Bombast von Hohenheim, an amiable, scholarly and respected burgher, was the physician of the village. His mother, of the family of Ochsner, belonged to a local religious sect, and was not, as is so often stated, the matron of the hospital. Doctor Bombast was a descendant of an old and celebrated family called of Hohenheim after their ancient residence, a castle in the vicinity of Stuttgart. He was his son's companion and instructor, and from him the boy learned as well the rudiments of alchemy, surgery and medicine. When the lad was nine years of age, the family removed to Villach where his father was the physician until his death. In the town there was a school founded by the Fuggers, of Augsburg, owners of lead mines, and here overseers and analysts were trained for the mines. In this school and in the mines and its laboratories Paracelsus gained his first interest in chemistry. The details of his formal schooling are obscure. He probably obtained his college education at Basel. We know that he received instruction from the celebrated Johan Trithemius, abbot of Wurzburg, one of the greatest living exponents of magic, alchemy and astrology, knowledge which was the basis of the dominant occultism in his later work.

Paracelsus is usually introduced with a list of names like a resounding roll of trumpets—Aureolus Philippus Theophrastus von Hohenheim, Paracelsus, Helvetius Eremita, and other extravagant variations. Such flourishes are the visible evidence of the legends which surround the man; a word or two is necessary to resolve this fantastic jumble. He was christened Theophrastus after the famous philosopher, the disciple of Aristotle. His parents may have given him the name Aureolus, a term often linked with the original Theophrastus, and Philippus may have been added at baptism to supply the customary saint's name, but neither of these names was ever used by Paracelsus himself. Bombast (not Bombastus), as we have seen, was the family name, and its connection with Paracelsus did not inspire the modern meaning of the word. Our term "bombast" is derived from an ancient word for cheap cotton used for stuffing, and hence by analogy has come to be employed for inflated or pompous speech. The name "Paracelsus" was adopted by the boy himself during his student years as was the custom of the time. Students travelling about to universities tended to take Greek or Latin names, as their own foreign

proper names were difficult to pronounce. The real surname of Erasmus, for example, was Gerhardt. In this manner Paracelsus came by his name, and inasmuch as it was chosen when he was a young student, it is unlikely that he interpreted it as meaning *beyond or superior to Celsus*, the great Roman medical writer, but rather gave the construction *beside Celsus*, which reflects the pride of the student entering the learned profession of medicine. The other names in his title are nicknames added by posterity. In the few authentic specimens of his handwriting, Paracelsus signs himself: Theophrastus, Theophrastus Paracelsus, or Theophrastus von Hohenheim.

Pascal has said that most of the evils of life arise from "man's being unable to sit still in a room". Whether for good or evil, when he was barely twenty, Paracelsus embarked on a career of travel, or possibly it might be described more correctly as years of wandering. The ferment of the Renaissance was working in him. Browning in his poem, with this idea in mind, has the fervent young Paracelsus exclaim:

"I go to prove my soul!  
I see my way as birds their trackless way.  
I shall arrive! what time, what circuit first,  
I ask not: but unless God send his hail  
Or blinding fire-balls, sleet or stifling snow,  
In some time, His good time, I shall arrive:  
He guides me and the bird. In His good time!"

He served in campaigns as army surgeon in Denmark, Italy and Belgium, visited England, Portugal and France. Like so many Swiss mercenaries of the time, he took part in wars in the East and was certainly in Constantinople. Later he was an army surgeon in wars in the service of Venice (1521-1525). Like that earlier vagabond-scholar of genius, Villon, he sought the company of the lowliest type and particularly those versed in occult lore. There is no positive evidence that he ever received the degree of Doctor of Medicine, although it seems unlikely that he could have held his later posts had he not done so. When he was attacked by his opponents for this roving life, he replied with a magnificent defense of wandering: "A physician must be a traveler. . . If one will know many diseases he must wander also. . . Does not travel give more knowledge than sitting behind the stove? . . . Those who hug the fire-place wear silks and golden chains, those who wander are scarce able to pay for their homespun. . . For this will I bear witness respecting nature; he who will investigate her ways *must travel her books with his feet.*"

In the year 1526, at the age of thirty-two, Paracelsus returned to Germany. He had gained great experience, and soon attracted attention as an original physician. But his methods rapidly aroused hostility in conventional quarters, and he comments: "I pleased no one but the sick whom I cured". In appearance he was unusually small, very delicately built, was

beardless, possessed a powerful nose and a sensitive mouth, and had a high, thin voice. Dr. Bernhardt Aschner says he was "not over 150 cm. high, had no attraction towards the female sex, and was of a very choleric and emotional temperament." Later he became more fleshy, his face puffy and smooth if we are to judge from portraits; at the last he was a prematurely old, thin, bitter man, preserving only the defiant, far-seeing appearance of the eyes.

In 1526 he was residing in Basel, where he treated some famous patients, notably Frobenius, the distinguished book publisher, and Erasmus, the greatest scholar and humanist of the time. He was appointed city physician, a position which carried with it the functions of a professorship in medicine, and now for the first time he moves to the centre of the historical stage as the born rebel. The following letter in Latin was placarded on the door of the University of Basel announcing his lectures.

"Theophrastus Bombast von Hohenheim, a hermetic doctor and professor of both medicines. Whereas of all disciples, medicine only as being a certain divine gift, is praised with the honourable title and name of necessity, by the testimony of sacred writ and profane also. We intend to purge and cleanse it from the barbarous and grievous errors now successfully exercising it. We do not bind ourselves to any precepts of the ancients, but such as are evidently true. For who knows not that most of the doctors of this age have grossly erred to the exceeding hazard of the sick, in obstinately adhering to the sayings of Hippocrates, Galen, Avicenna, just as if they had been so many tripods or oracles from which it is unlawful to depart a finger's breadth. These authors make us brave doctors, but not physicians. For it is not title, nor eloquence, nor reading, nor many books, (though these things are ornaments) that make physicians, but an excellent and deep knowledge of things mysterious which is worth all the rest. The rhetorician learns to speak eloquently and persuade the judge, but the physician knows the kinds, the causes and the symptoms of affairs, and by piercing sight and industry to administer medicines rightly, and to heal who can be healed. Know then that I, being invited by the large stipend of Basle, do for two hours spare daily, publicly interpret, with accurate diligence my books, both of active and inspective medicine, to the great profit and advantage of my hearers. Wherefore, honest readers, if the mysteries of this apollinean art are delightful enough to any of you, and you covet thoroughly to learn in a short time, whatever pertains to this discipline, come to us at once at Basle, and you shall find other and greater things than I can describe in these few lines. But that my intention may appear more clearly to the studious, I am not ashamed to say that we do not all agree with the ancients in attributing all diseases to complexions and humors, for that is an error which has prevented doctors from reaching the truths as to diseases in their days. Let this as shown through a lattice suffice for today, but do not decide rashly until you have heard Theophrastus. Fare ye well and take in good part this our effort toward reformation in medicine.

MDXXVII June, Basle.

Such statements and his bold divergence from the accepted doctrines and practice of the established medical schools at once aroused fierce opposition. To these offences he added the audacious heresy of teaching in the vernacular German rather than in the customary Latin tongue. With his irritable temper and love of conflict Paracelsus carried the battle to his op-

patients. In a characteristic gesture he showed his breach with traditional authority by throwing into the students' bonfire on St. John's Day celebration, the most revered authority of the medical world of that time, the Canon of Avicenna. To the Galenical medical world this was the equivalent of the burning of the papal bull by Martin Luther. The battle was joined and the inevitable crisis arrived. When a prominent citizen of Basel, Canon Lichtenfels, whom he had cured, refused to pay his fee, Paracelsus sued him. The court ruled against Paracelsus, whereupon he denounced the courts and judges with such violence that he was forced to flee Basel.

Browning in his "Paracelsus" has him describe his Basel period in vivid words:

"Just so long as I was pleased  
To play off the mere antics of my art,  
Fantastic gambols leading to no end,  
I got huge praise. . . . There they flocked,  
Poor devils, jostling, swearing and perspiring,  
Till the walls rang again; and all for me!  
. . . . I spoke out.  
Forthwith a mighty squadron, in disgust,  
Filed off — 'The sifted chaff of the sack', I said,  
Redoubling my endeavours to secure  
The rest. When lo! one man had tarried so long  
Only to ascertain if I supported  
This tenet of his, or that; . . . The other worthy  
Discovered divers verses of St. John,  
Which read successively, refreshed the soul,  
But, muttered backwards, cured the gout, the stone,  
The colic, and what not. Quid multa? The end  
Was a clear class-room, and a quiet leer  
From grave folk, and a sour reproachful glance  
From those in chief, who, cap in hand, installed  
The new professor scarce a year before.  
. . . . Good night to Basil, then!  
But fast as I proposed to rid the tribe  
Of my obnoxious back, I could not spare them  
The pleasure of a parting kick."

This parting kick is to be found in his book, the *Paragranum* which is a flaming outburst against slavery to the past and an indictment of the "abandoned academic Baebantes who bear the name of doctor". It was not printed during his life. In its pages are passages of caustic eloquence, including the following which has become famous:

"Follow after me — not I after you — Ye after me, Avicenna, Galen, Rhasis, Montagnana, Mesue and ye others. After me and not I after you — ye of Paris, ye of Montpellier, ye of Swabia, ye of Meissen, ye of Cologne, ye of Vienna, and those who are on the Danube and the Rhine, ye islands of the sea — thou Italia, thou Palmaria, thou Athens, thou Greece, thou Arabia, thou Israelita, after me and not I after you. — there will none of you remain in the furthest corner on whom the dogs will not turn. I shall be monarch and mine will be the monarchy."

He denounced the apothecaries and their "grievance".

"The apothecaries are my enemies because I will not empty their boxes. My recipes are simple and do not call for forty or fifty ingredients."

So, breathing defiance to the faculties and the profession, Paracelsus left Basel in 1528 after a residence of less than two years. For

the remaining thirteen years of his life he was the lonely wanderer, a voice crying in the wilderness. He was driven from city to city, sometimes by restlessness, more often by bitter persecution. He devoted his time to practice, but more especially to writing treatises upon medicine, surgery, chemistry, philosophy and theology, almost all of which were refused publication in his day through the censorship of the entrenched Galenist medical authorities. It is the old story of the man and his message. These for the most part were years of fluctuating fortune, and at times of grinding poverty. We find him in Nuremberg in 1529 endeavouring to publish certain works. We get a glimpse of him in St. Gallen about 1533 in the entry of a diary of a citizen of the time: "Theophrastus is most laborious, he sleeps little, without undressing, throws himself, booted and spurred, on the bed for some three hours, and ceaselessly writes."

In 1534 he is to be seen entering Innsbruck in the Austrian Tyrol in poverty and rags. He seems to have retained, however, a considerable popular reputation. He ranged over the fields of medicine and mystical philosophy and astrology, even indulging, as was the custom of the time, in occasional prognostications of political and other events. Possibly on account of his eminence in the secret arts of alchemy and astrology, he was at length invited by the Prince Palatine, Duke Ernst of Bavaria, to the city of Salzburg where he seems finally to have found some security and a measure of peace. Here he died on the twenty-fourth of September, 1541. His last will and testament, written three days before death, has been preserved. None of the theories of the cause of his death are quite satisfactory. If one may judge from drawings made of him during the last two or three years of life, he suffered from some constitutional disease, as he had the appearance of advanced age.

He died in the faith of the church many of whose doctrines he had so savagely denounced. Rebel as he was, he still retained allegiance to the Catholic faith and ritual which had gathered unto itself so much of the richness and symbolism of the past. Like Browning's prelate, he was content in the end to lie where he could

"Hear the blessed mutter of the Mass,  
And see God made and eaten all day long."

He was buried in the graveyard of St. Sebastian in Salzburg. At the base of his monument is the following inscription which, in translation from the Latin, reads:

"Here is buried Philippus Theophrastus, distinguished doctor of medicine, who with wonderful art cured dire wounds, leprosy, gout, dropsy and other contagious diseases of the body, and who rose to the poor the goods which he obtained and accumulated. In the year of our Lord 1541, the 24th of September, he exchanged life for death."

(To be continued)



## Association Notes

### THE SEVENTY-SECOND ANNUAL MEETING

of the

## Canadian Medical Association

TO BE HELD IN WINNIPEG, JUNE 23, 24, 25, 26, 27, 1941

**Convention Headquarters—Royal Alexandra Hotel**

<i>President</i>	-	-	-	DR. DUNCAN GRAHAM, Toronto
<i>President-Elect.</i>	-	-	-	DR. GORDON S. FAHRNI, Winnipeg
<i>General Secretary</i>	-	-	-	DR. T. C. ROUTLEY, Toronto

#### A Message from the President-Elect

Eleven years have passed since the Canadian Medical Association met conjointly with the British Medical Association in Winnipeg in 1930. Manitoba's turn to entertain the Dominion medical organization has come again—had it come in Peace Time, how happy we would have been! Last year a few weeks before the Annual Meeting in Toronto in June, when France was capitulating, there developed a strong current of opinion among a few that the meeting should be cancelled or, failing this, reduced to one of executive sessions only. Your Executive did not agree and the whole program was carried out as planned. The registration of physicians was the highest on record excepting only the conjoint meeting of the British Medical Association and the Canadian Medical Association in Winnipeg, August, 1930. The experience of last year has strengthened the hand of your Executive Committee and the Local Committee on Arrangements in their decision to proceed with the Annual Meeting in its usual form.

The Scientific Sessions are to be held on June 25th, 26th and 27th. Round-table Conferences from 9 to 10 o'clock introduce the program each morning and the General Sessions continue from 10.15 to 12.00 o'clock. The Sectional Meetings are convened each afternoon at 2 o'clock.

The General Council meets the first two days of the week, and the Annual Meetings of the Saskatchewan and Manitoba Divisions are scheduled for Tuesday afternoon, June 24th.

The profession of Manitoba are keenly conscious of the generous gesture of the Saskatchewan Division in moving their Annual Meeting this year to Winnipeg, and it is our hope that the large delegation that we are expecting from that Province will have no reason to regret their kind co-operation.

In addition to the Annual General Meeting Wednesday evening, a variety of entertainment is planned for all visiting physicians and their wives.

His Honour, the Lieutenant-Governor, and Mrs. McWilliams, in their gracious spirit of co-operation, are planning a Garden Party at Government House.

On behalf of the wives of the physicians of Manitoba may I state that they hope to have the pleasure of entertaining many wives of physicians from Halifax to Victoria.

The medical profession of Manitoba extends to the profession of each of the other eight provinces a hearty invitation to our meeting next June.

GORDON S. FAHRNI,  
*President-Elect.*

Plans for the Seventy-second Annual Meeting, to be held in Winnipeg during the week of June 23rd next, are progressing most satisfactorily.

The Central Program Committee, under the Chairmanship of Dr. Duncan Graham, with valuable aid from the Local Program Committee in Winnipeg, has arranged a scientific program which should attract a large attendance.

General Council will meet on Monday and Tuesday.

On Tuesday afternoon both the Manitoba and Saskatchewan Divisions of the Association will hold their annual meetings.

The fourth annual conference of Medical Secretaries will be held on Monday evening.

The Canadian Medical Protective Association will hold its Annual Meeting at the close of the luncheon on Friday.

On Tuesday evening, members of General Council will be dinner guests of their Manitoba hosts.

Round-Table Conferences, instituted so successfully two years ago, will be continued this year on the mornings of Wednesday, Thursday and Friday, from nine to ten o'clock.

General Sessions will be held on Wednesday, Thursday and Friday mornings from 10.15 o'clock until 12.00 noon.

The various sections will hold their meetings on the afternoons of Wednesday, Thursday and Friday.

The Annual General Meeting will be held on Wednesday night.

Once again, as at the Toronto meeting, Thursday night has been given over to a dinner meeting under the auspices of the Committee on Medical Economics, of which Dr. Wallace Wilson, of Vancouver, is the Chairman.

Golfers are reminded that the Golf Tournament will be held all day Tuesday, when play for the beautiful Ontario Cup and other prizes will take place.

All the meetings will be held in the Royal Alexandra Hotel. The management has very kindly placed at our disposal the entire facilities of the hotel, thus affording splendid accommodation for all our requirements.

The Ladies have prepared an excellent program of entertainment for the visiting Ladies, full particulars of which will appear in the next issue of the *Journal*.

## COMMITTEE ON ARRANGEMENTS

### Chairman

THE PRESIDENT-ELECT, DR. G. S. FAHREN

### General Secretary

DR. T. C. ROUTLEY, TORONTO

### Local Honorary Secretary

DR. M. J. ORMEROD

## Chairmen and Secretaries of Committees

BADGES AND SIGNS—DR. A. BLONDAL, *Chairman*.

DR. L. A. SIGURDSON, *Secretary*.

COMMERCIAL EXHIBITS—DR. E. H. ALEXANDER, *Chairman*.

DR. H. MEDOVY, *Secretary*.

ENTERTAINMENT—DR. H. D. KITCHEN, *Chairman*.

DR. A. M. GOODWIN, *Secretary*.

GOLF—DR. G. L. ADAMSON, *Chairman*.

DR. I. O. FRYER, *Secretary*.

HOUSING AND EQUIPMENT—DR. J. M. MCEACHERN, *Chairman*.

DR. K. C. MCGIBBON, *Secretary*.

PUBLICITY—DR. W. F. ABBOTT, *Chairman*.

DR. F. G. ALLISON, *Secretary*.

REGISTRATION—DR. W. E. CAMPBELL, *Chairman*.

DR. EMMET DWYER, *Secretary*.

SCIENTIFIC EXHIBITS—DR. SARA MELTZER, *Chairman*.

DR. H. V. RICE, *Secretary*.

TRANSPORTATION—DR. M. R. MACCHARLES, *Chairman*.

DR. B. R. MOONEY, *Secretary*.

FINANCE—DR. F. G. MCGINNNESS, *Chairman*.

DR. W. G. BEATON, *Secretary*.

LIAISON WITH LADIES' COMMITTEE—DR. P. H. T.

THORLAKSON, *Chairman*.

DR. B. D. BEST, *Secretary*.

## Chairmen and Secretaries of Sections

ANESTHESIA—DR. D. C. AIKENHEAD, *Chairman*.

DR. D. G. REVELL, *Secretary*.

DERMATOLOGY—DR. A. M. DAVIDSON, *Chairman*.

DR. GEO. BROCK, *Secretary*.

MEDICINE—DR. J. D. ADAMSON, *Chairman*.

DR. D. S. McEWEN, *Secretary*.

OBSTETRICS AND GYNECOLOGY—DR. J. D. McQUEEN,

*Chairman*.

DR. C. R. RICE, *Secretary*.

OPHTHALMOLOGY AND OTOLARYNGOLOGY—DR. E. J.

WASHINGTON, *Chairman*.

DR. F. A. MACNEIL, *Secretary*.

PEDIATRICS—DR. GORDON CHOWN, *Chairman*.

DR. HAROLD POPHAM, *Secretary*.

RADIOLOGY—DR. DIGBY WHEELER, *Chairman*.

DR. R. A. MATHESON, *Secretary*.

STOLOGY—DR. O. S. WAUGH, *Chairman*.

DR. S. G. HERBERT, *Secretary*.

UROLOGY—DR. H. D. MORSE, *Chairman*.

DR. D. SWARTZ, *Secretary*.

HISTORICAL MEDICINE—DR. ROSS MITCHELL, *Chairman*.

PROF. I. MACLAREN THOMPSON, *Secretary*.

MILITARY MEDICINE—COLONEL P. G. BELL, *Chairman*.

LIEUT. COLONEL T. E. HOLLAND, *Secretary*.

## Local Program Committee

*Chairman*—DEAN A. T. MATHERS

*Secretary*—DR. C. W. BURNS

Drs. D. C. Aikenhead, A. M. Davidson, J. D. Adamson, J. D. McQueen, E. J. Washington, Gordon Chown, Digby Wheeler, O. S. Waugh, H. D. Morse, Ross Mitchell and Colonel P. G. Bell.

## Local Advisory Committee

*Chairman*—DR. G. S. FAHREN, PRESIDENT-ELECT

*Hon. Secretary*—DR. M. J. ORMEROD

Dr. E. L. Ross, President, Manitoba Medical Association; Dr. H. D. Kitchen, Vice-President, Manitoba Medical Association; Dr. Digby Wheeler, President, Winnipeg Medical Society; Dr. J. S. McInnes, President, College of Physicians and Surgeons of Manitoba; Dr. A. T. Mathers, Dean of Faculty of Medicine, University of Manitoba; Dr. O. C. Trainor, Manitoba representative on Canadian Medical Association Executive Committee; Dr. J. D. Adamson, Professor of Medicine, University of Manitoba; Dr. A. F. Menzies, Southern District; Dr. H. O. McDiarmid, Central and Western Districts; Dr. R. E. Dicks, Northern part of Province.

## Ladies' Committee

*Convener*—MRS. G. S. FAHREN

Mrs. M. J. Ormerod, Mrs. A. W. S. Hay, Mrs. H. D. Kitchen, Mrs. Digby Wheeler, Mrs. J. S. McInnes, Mrs. A. T. Mathers, Mrs. O. C. Trainor, Mrs. J. D. Adamson, Mrs. A. F. Menzies, Mrs. H. O. McDiarmid, Mrs. R. E. Dicks, Mrs. E. L. Ross, Mrs. P. H. T. Thorlakson.

## GENERAL SESSIONS

*Speakers and Subjects as Arranged to Date*

Valedictory Address by the President

Dr. Duncan Graham, Toronto.

Dr. William F. Braasch, Rochester, Minn.

The surgical kidney as a factor with hypertension.

Dr. Charles Hunter, Winnipeg

Dizziness from the internist's standpoint.

Dr. F. W. Jackson, Winnipeg

Some observations on maternal care.

Dr. A. F. Menzies, Morden

Post-war medical problems.

Dr. Gavin Miller, Montreal

Recent advances in the surgical approach to carcinoma of the large bowel and rectum.

Dr. Rustin McIntosh, New York

Jaundice.

Dr. Kenneth G. McKenzie, and

Dr. E. H. Botterell, Toronto

The common neurological syndromes produced by pressure from extrusion of an intervertebral disc. (Illustrated by coloured film).

Dr. G. E. Richards, Toronto

Ten years' progress in the radiotherapy of oral cancer. Present methods and present results.

The Osler Lecture.

Speaker to be announced.

Dr. Wallace Wilson, Vancouver

Whither Medicine!

Dr. Ralph M. Tovell, and

Dr. Curtiss B. Hickcox, Hartford, Conn.

The present status of cyclopropane.



## SECTIONAL MEETINGS

## Section of Anæsthesia

- Dr. D. H. Huggins, Winnipeg  
Avertin in neuro-surgery.
- Dr. D. G. Revell, Winnipeg  
Ether, the all-purpose anæsthetic.
- Dr. H. V. Rice, Winnipeg  
Newer concepts of anæsthetic physiology.
- Dr. C. H. Robson, Toronto  
Anæsthesia for children (illustrated by coloured film).
- Dr. R. M. Tovell, and  
Dr. A. W. Friend, Hartford, Conn.  
The control of physical hazards of anæsthesia.
- Symposium on Spinal Anæsthesia  
Dr. Byron R. Burwash, Saskatoon  
Analeptics.
- Dr. I. H. Davidson, Winnipeg  
Pre-medication.
- Dr. K. E. Hollis, Toronto  
Indications and contraindications.
- Dr. H. J. Shields, Toronto  
Physiology.
- Dr. G. D. Stanley, Calgary  
Sequelæ in intraspinal anæsthesia.
- Dr. Norman S. Clark, Toronto  
Agents.

## Section of Historical Medicine

- Dr. William Boyd, Toronto  
The evolution of medical science.
- Dr. J. H. Elliott, Toronto  
Osler's class at the Toronto School of Medicine.
- Dr. W. A. Gardner, Winnipeg  
A voice from St. Helena.
- Dr. J. A. Gunn, Winnipeg  
Ambroise Paré as a military surgeon.
- Dr. J. C. Hossack, Winnipeg  
History of the plague.
- Dr. D. S. Macnab, Calgary  
Hugh Owen Thomas.
- Dr. A. G. Nicholls, Montreal  
Herba panacea.
- Dr. N. R. Rawson, Winnipeg  
William Farr, founder of vital statistics.
- Dr. D. G. Revell, Edmonton  
The first twenty-five years of anatomy teaching in Alberta.

## Section of Medicine

- Dr. G. F. Amyot, Victoria  
Public health and the private practice of medicine.
- Dr. Eldon M. Boyd, Kingston  
Expectoration, expectorants and cough medicines.
- Dr. William Boyd, Toronto  
Changing views regarding pyelonephritis.
- Dr. F. T. Cadham, Winnipeg  
Vaccine therapy in atrophic arthritis.
- Dr. A. T. Cameron, Winnipeg  
Blood plasma; proteins;—their clinical significance.
- Dr. R. J. Collins, East Saint John  
Problems arising in rehabilitation schemes for the tuberculous.
- Dr. J. H. Geddes, London  
What is colitis?
- Dr. A. A. Fletcher, and  
Dr. Wallace Graham, Toronto  
Gold therapy in chronic arthritis.
- Dr. F. C. Heal, Moose Jaw  
The management of common disorders of cardiac rhythm.
- Dr. E. S. Mills, and  
Dr. E. S. Murray, Montreal  
The relative value of the various sulphonamide drugs in the treatment of acute respiratory infections including pneumonia.
- Dr. J. M. McEachern, Winnipeg  
Coronary disease in Manitoba.
- Dr. D. S. McEwen, Winnipeg  
Upper respiratory infection in general practice.
- Dr. Harris McPhedran, Toronto  
Cardiovascular disease associated with toxic goitre.
- Dr. Trevor Owen, Toronto  
Fatigue, rest and exercise.
- Dr. T. A. Pincock, Brandon  
Transitions in psychiatry.
- Dr. John W. Scott, Edmonton  
The natural history of migraine.
- Dr. S. E. C. Turvey, Vancouver  
Asymptomatic neurosyphilis.

## Section of Military Medicine

- Symposium—Medical aspects of casualties returning from overseas.
- Introduction—  
Lieut.-Colonel A. M. Davidson, President,  
Standing Medical Board, No. 10 Detachment, R.C.A.M.C., M.D. 10.

**Section of Military Medicine—Continued****Medical Cases—**

Captain H. S. Atkinson, No. 10 Detachment, R.C.A.M.C.

Dr. J. D. Adamson, Medical Staff, D.P.&N.H., Winnipeg.

**Surgical Cases—**

Lieut.-Colonel T. E. Holland, R.C.A.M.C., Officer Commanding, Fort Osborne Military Hospital, M.D. 10.

Dr. J. A. Gunn, Surgeon, D.P.&N.H., Winnipeg.

**Eye, Ear, Nose and Throat Cases—**

Major H. G. Grieve, No. 10 Detachment, R.C.A.M.C.

**Problems of Army Hygiene**

Major M. R. Elliott, District Hygiene Officer, No. 10 Detachment, R.C.A.M.C.

**Special problems of the R.C.A.F. Medical Officer**

Wing-Commander G. E. Hall, Ottawa.

**Section of Obstetrics and Gynaecology**

Dr. L. C. Conn, and  
Dr. J. R. Vant, Edmonton

**Uterine prolapse.**

Dr. Léon Gérin-Lajoie, Montreal

Contribution to the surgery of the pre-sacral nerve in gynaecological ailments.

Dr. W. S. Holmes, Saskatoon

Induction of labour—indications, methods and dangers.

Dr. P. J. Kearns, Montreal

Anatomical changes in the lower uterine segment in pregnancy and labour.

Dr. John Mann, Toronto

Toxaemia of pregnancy; present day classification; etiology and treatment.

Dr. F. G. McGuinness, Winnipeg

The obstetrical significance of intra-cranial injury of the newborn, based on 300 autopsies.

Dr. A. B. Nash, Victoria

Treatment of acute and chronic salpingitis.

Dr. N. W. Philpott, Montreal

Anaesthesia and analgesia in obstetrics with particular reference to the use of local anaesthesia.

Dr. C. R. Rice, Winnipeg

Disturbances of menstrual function in tuberculous patients.

**Section of Ophthalmology**

Dr. K. J. Austmann, Winnipeg

Glaucoma.

Dr. D. M. Genoff, Winnipeg

Senile cataract.

**Surgery****Fraactures**

Dr. A. Gibson, Winnipeg.

**Acute appendicitis**

Dr. P. H. T. Thorlakson, Winnipeg.

**Tumour clinic**

Dr. Daniel Nicholson, Winnipeg, *Chairman*

Dr. George T. Paek, New York, *visiting consultant.*

1. Cancer of the retina in diabetes.

**Section of Otolaryngology**

Dr. G. W. Fletcher, Winnipeg

Tumours of the larynx—diagnosis and treatment.

Dr. Keith Hutchison, Montreal

Acute otitic meningitis; chemotherapy advances.

Dr. Gregor McGregor, Toronto

Bronchoscopy—a safeguard against diagnostic errors.

Dr. George Tremble, Montreal

Irrigation of the sphenoid sinuses—a safe and simple method (illustrated by coloured film).

Dr. E. J. Washington, Winnipeg

Intra-cranial complications of otogenous origin with review of cases.

Clinical presentation of cases at the General Hospital and St. Boniface Hospital.

class or coach fare, plus 25 cents. Tickets are good going and returning via same route, or going via one authorized route and returning via any other authorized route. Return limit, thirty days, in addition to date of sale. Passengers must reach original starting point not later than midnight of final return limit.

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**WINNIPEG HOTELS****DAILY RATES—EUROPEAN PLAN**

	Single room without bath	Single room with bath	Double room without bath	Double room with bath
Clarendon Hotel.....	\$1.50	\$2.00	\$2.00	\$2.50
Fort Garry Hotel.....	3.50	5.00	5.00	7.00
Mall Hotel.....	2.50	3.00	4.00	5.00
Marlborough Hotel.....	2.00	3.00	3.00	4.50
Royal Alexandra Hotel.....	3.50	5.00	5.00	7.00
St. Charles Hotel.....	1.50	2.25	2.50	4.00
St. Regis Hotel.....	1.50	2.50	2.50	3.50

## SECTIONAL

## Section of Anæsthesia

Dr. D. H. Huggins, Winnipeg

Avertin in neuro-surgery.

Dr. D. G. Revell, Winnipeg

Ether, the all-purpose anæsthetic.

Dr. D. G. Revell, Winnipeg

## Section of Radiology

Dr. L. J. Carter, Brandon

Radiological examination of the terminal ileum and proximal colons—a twenty-five year résumé.

Dr. A. D. Irvine, Edmonton

Coarctation of the aorta, radiologically considered.

Dr. Hervé Lacharité, Montreal

Osteochondritis dissecans.

Dr. W. H. McGuffin, Calgary

Radiological evidence as a diagnostic aid in diseases of the heart.

Dr. Carleton B. Peirce, and

Dr. D. L. McRae, Montreal

Bronchography in pulmonary disease of undetermined cause.

Symposium on Carcinoma of the Cervix  
Sequelæ in intraspinal anæsthesia.

Dr. Norman S. Clark, Toronto  
Agents.

## Section of Historical Medicine

Dr. William Boyd, Toronto

The evolution of medical science.

Dr. J. H. Elliott, Toronto

Osler's class at the Toronto School of Medicine.

Dr. W. A. Gardner, Winnipeg

A voice from St. Helena.

Dr. J. A. Gunn, Winnipeg

Ambroise Paré as a military surgeon.

Dr. J. C. Hossack, Winnipeg

History of the plague.

Dr. D. S. Maenab, Calgary

Hugh Owen Thomas.

Dr. A. G. Nicholls, Montreal

Herba panacea.

Dr. N. R. Rawson, Winnipeg

William Farr, founder of vital statistics.

Dr. D. G. Revell, Edmonton

The first twenty-five years of anatomy teaching in Alberta.

## Section of Surgery—Continued.

Dr. Chas. W. Harris, Toronto

Injuries about the ankle joint.

Dr. Robert C. Laird, Toronto

The diagnosis and treatment of bronchiectasis.

Dr. R. K. Magee, Peterborough

Subphrenic abscess.

Dr. Herbert Meltzer, Ninette

181 cases of thoracoplasty.

Dr. H. F. Moseley, Montreal

Shoulder pain.

Dr. M. R. MacCharles, Winnipeg

Causes of poor results in biliary tract surgery.

Dr. Lorne H. McConnell, Saskatoon

Epilepsy—analysis of the results of 91 craniotomies.

Dr. J. S. McEachern, Calgary

Some surgical problems arising from developmental errors.

Dr. O. W. Niemeier, Hamilton

Obstructive jaundice.

Dr. George Ramsay, London

Anterior poliomyelitis; observations on recovery rate of paralyzed muscles.

Dr. Fulton Risdon, Toronto

The present status of the treatment of hare lip and cleft palate deformities.

Dr. Dudley E. Ross, and

Dr. J. H. Palmer, Montreal

The surgical treatment of patent ductus arteriosus.

## Section of Urology

Dr. E. D. Busby, London

Present status of chemotherapy in urinary infections.

Dr. W. F. Braasch, Rochester, Minn.

1 Prognosis in non-surgical bilateral renal tuberculosis.

I Dr. Earl Hall, Vancouver

Carcinoma of the penis.

I Dr. J. C. McClelland, Toronto

Anuria.

I Dr. Frank S. Patch, and

Dr. J. T. Codnere, Montreal

Treatment of hydronephrosis secondary to aberrant renal vessels.

§ Dr. Robin Pearse, Toronto

Lipofibrosarcoma of the kidney.

Dr. Frederick Pilcher, Calgary

Transurethral prostatic resection.

**Section of Urology—Continued**

- Dr. Emerson Smith, Montreal  
Experiences with interstitial cystitis
- Dr. C. B. Stewart, Winnipeg  
Persistent Wolffian duct—report of cases.
- Dr. G. N. Tucker, Edmonton  
Recumbency urolithiasis.

**Medical Economics**

- Municipal doctor system in Saskatchewan  
Dr. R. O. Davison, Regina.
- What is an adequate medical service?  
Dr. E. S. Moorhead, Winnipeg.
- Some of the weaknesses observed in health insurance plans which have been studied.  
Dr. T. C. Routley, Toronto.

**Summary**

- Mr. Hugh H. Wolfenden, Toronto, Consulting Actuary of the Association.

**ROUND-TABLE CONFERENCES****Subjects and Chairmen****Medicine**

- Migraine  
Dr. H. D. Kitchen, Winnipeg.
- Normal blood pressure variations  
Dr. L. G. Bell, Winnipeg, *Chairman*  
Dr. J. D. Adamson, Winnipeg  
Squadron Leader F. A. L. Mathewson, Regina  
Dr. Alex. McLean, Rochester.
- Prevention of common cold  
Dr. William Wood, Winnipeg.

**Obstetrics and Gynecology**

- Management of ante- and post-partum hemorrhage  
Dr. Ross Mitchell, Winnipeg.
- Carcinoma of the uterus  
Dr. J. D. McQueen, Winnipeg.

**Ophthalmology**

- Orthoptic treatment of strabismus  
Dr. F. A. McNeil, Winnipeg.
- Corneal lesions  
Dr. J. T. Cruise, Winnipeg.

**Otolaryngology**

- Upper respiratory infections  
Dr. Robert Black, Winnipeg, *Chairman*  
Dr. A. Leishman, Winnipeg  
Dr. F. D. McKenty, Winnipeg.

**Pædiatrics**

- Chronic cough in childhood  
Dr. O. J. Day, Winnipeg.
- Genito-urinary infections in childhood  
Dr. C. B. Stewart, Winnipeg.

**Surgery****Fractures**

- Dr. A. Gibson, Winnipeg.

**Acute appendicitis**

- Dr. P. H. T. Thorlakson, Winnipeg.

**Tumour clinic**

- Dr. Daniel Nicholson, Winnipeg, *Chairman*  
Dr. George T. Paek, New York, visiting consultant.
1. Cancer of the breast—case presentation.
  2. Tumours in the neck (where primary site was not obvious). Report of final diagnoses in the last 100 cases at the Winnipeg General Hospital Tumour Clinic.  
Carotid body tumour—case presentation.
  3. Neurogenic sarcoma—case presentation.

**Urology****Bladder tumours**

- Dr. H. D. Morse, Winnipeg.

**The present status of endocrine therapy in urology**

- Dr. C. B. Stewart, Winnipeg.

**TRANSPORTATION**

Identification certificates may be obtained from the office of the General Secretary, 184 College Street, Toronto. These certificates entitle the purchaser to round-trip fare at one and one-third of the adult normal one-way first class or coach fare, plus 25 cents. Tickets are good going and returning via same route, or going via one authorized route and returning via any other authorized route. Return limit, thirty days, in addition to date of sale. Passengers must reach original starting point not later than midnight of final return limit.

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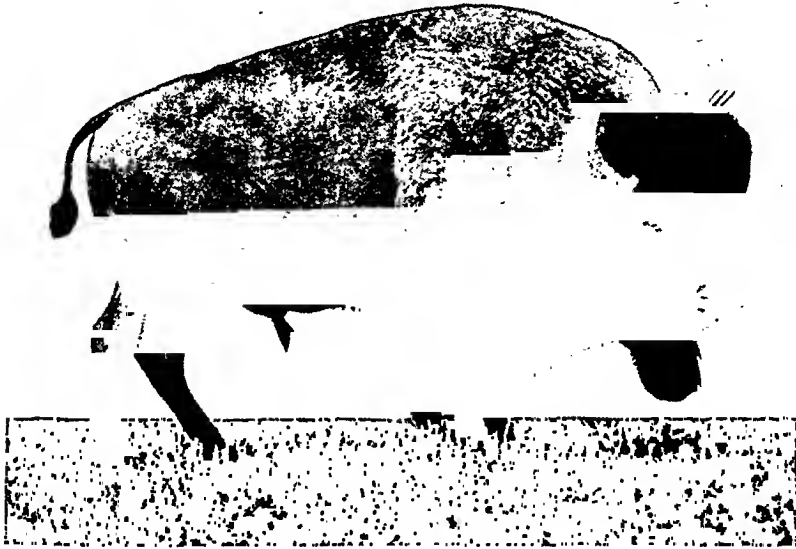
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St. Regis Hotel.....	1.50	2.50	2.50	3.50

## MANITOBA AND ITS CAPITAL



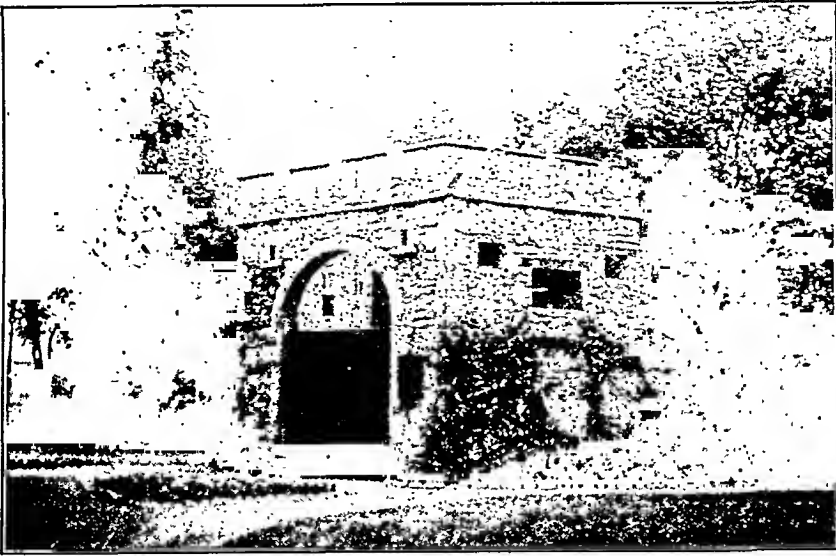
Pierre Gaultier de la Verendrye, accompanied by two sons, arrived at the Forks of the Red and Assiniboine Rivers on September 24, 1738, the first white men to see the site of the future city of Winnipeg. They found there only ten Cree huts and two chiefs. After a few days they continued up the Assiniboine River to what is now Portage la Prairie, but were soon followed by one of the partners who, in October, 1738, started the erection of Fort Rouge on the south bank of the Assiniboine River, now part of Winnipeg. La Verendrye and his party continued their explorations westward and into what is now the states of North and South Dakota and Montana, in the hope and belief that that land might contain a water route to the Pacific Ocean. He died on December 6, 1749.

**The Selkirk Settlement.**—Lord Selkirk was one of the shareholders of the Hudson's Bay Company, and, to carry out his colonization plans, he made arrangements whereby he obtained a land grant of 116,000 square miles on the banks of the Red and Assiniboine Rivers from this Company. The first party of his settlers from the north of Scotland and the Orkney Islands arrived on the banks of the Red River at what is now Kildonan on August 30, 1812, travelling in small sailing boats to York Factory on Hudson Bay, thence via the Hayes River, Lake Winnipeg, and the Red River to their destination. The descendants of these

settlers are very proud of their heritage, and, today, are numbered amongst our most highly respected citizens.

**Upper Fort Garry.**—What is now the City of Winnipeg had within its territory in the early Red River days many forts or fur-trading posts, including Fort Rouge, Fort Gibraltar and Fort Douglas. Chief among them in point of importance and historic significance was Fort Garry, headquarters of the Hudson's Bay Company. It was erected in 1822 on the site of what was formerly Fort Gibraltar. In 1835 it was re-built with many alterations and extensions. It was unfortunate that it occupied ground that blocked an important thoroughfare, Main Street south, which necessitated its final demolition in 1882.

**Lower Fort Garry.**—Twenty miles north of Winnipeg on the banks of the Red River is Lower Fort Garry, a fort whose bastions, loopholed walls, as well as many of its interior structures, are built of Manitoba stone quarried nearby. To the Selkirk Settlers it was known as Fort Garry, but the fur traders, Hudson's Bay Company officers and servants, the voyageurs and Indians, knew it and talked familiarly about it as the Stone Fort. It is the only stone fort of the early fur traders in Canada still intact and in a state of perfect preservation, and through the generosity of the Hudson's Bay Company will go down to posterity as a monument of the early Red River days. Building was commenced in 1831, and completed with walls and bastions in 1839. The Hudson's Bay Company have leased it to the Motor Country Club, and members and visitors alike enjoy its golf course and hospitality.



GATEWAY TO UPPER FORT GARRY, WINNIPEG

**Winnipeg.**—In 1870 the population of the City of Winnipeg was 215; today, over 224,000, (Greater Winnipeg over 318,000). It was incorporated in 1873, with a population of 1,869, and is the capital city of Manitoba and one of Canada's four metropolitan centres. Its altitude above sea level is 760 feet. Winnipeg is an important manufacturing centre, and the gateway to rich and extensive mining areas. It has also become the greatest grain centre on the North American continent, the financial, commercial, wholesale and manufacturing centre of the Middle West, and the educational centre of the Province. It has over sixty hotels, forty-two beautiful public parks and squares, eighteen golf courses. The city has wide and well paved thoroughfares, beautiful boulevards and residential streets. Its three main thoroughfares, 132 feet wide, are the widest on the continent.

The city is noted for many fine public buildings and beautiful homes; having the largest cash grain market in the world; the cheapest hydro-electric light and power on the continent; the largest individually owned railway yards in the world; and the largest Musical Festival in the British Empire.

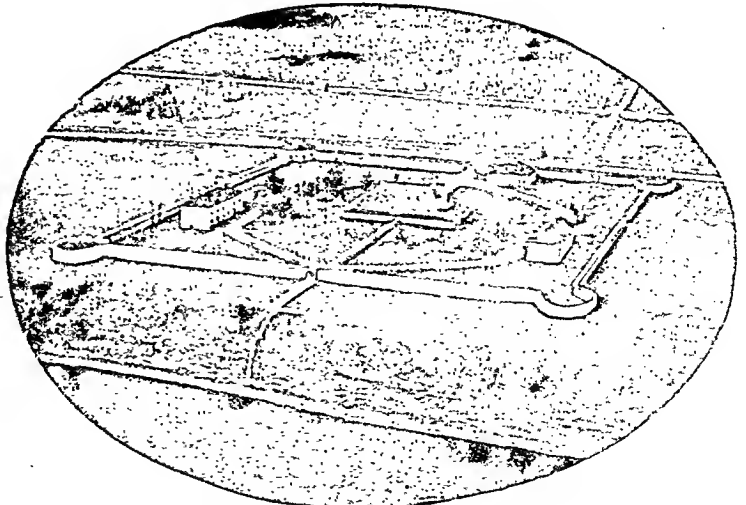
Winnipeg's principal shopping district extends along Portage Avenue and Main Street, two splendid business thoroughfares noted for their great width. Here the visitor will find large departmental stores, presenting merchandise from the four corners of the earth. In the district will also be found splendid moving picture houses, vaudeville and

legitimate stage theatres, restaurants, etc. The larger stores maintain travel bureaux for the convenience of visitors.

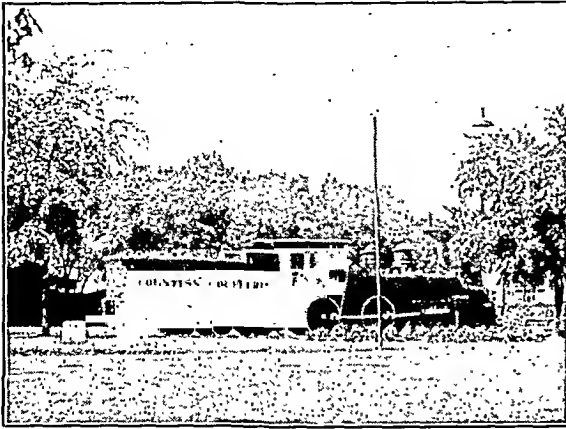
The Parliament Building, one of the finest and largest structures of its kind on the continent, is built of native Tyndall stone, and is a splendid monument to the progressive public-spirited people of Winnipeg and Manitoba.

The Auditorium, also built of the same native stone, is the finest building of its kind in Canada. It is a civic venture and cost over one million dollars.

Stevenson Airport, one of the most modern on the continent, affords air travel to the south, east and west, as well as the mining fields in northern Manitoba.



LOWER FORT GARRY FROM THE AIR



FIRST ENGINE IN WINNIPEG REGION

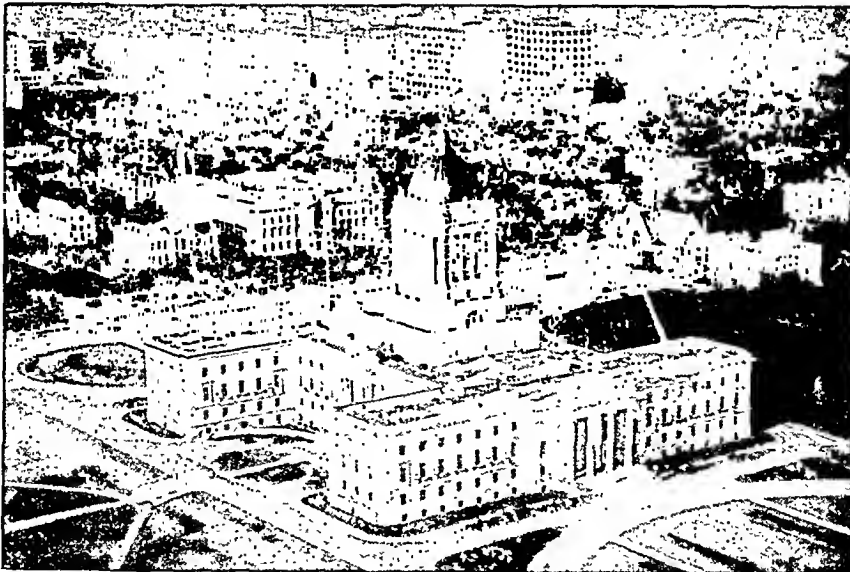
Winnipeg, in the very centre of Canada, is also a focal point for railway and bus transportation in all directions.

CKY Radio Station is one of the most powerful in Canada, with modern studios. Visitors are welcome to see through the studios on personally conducted tours.

**Fort Prince of Wales.**—Was erected of wood by the early Hudson's Bay Company traders

on the shore of Churchill Bay, and, being greatly outnumbered, the Governor surrendered this great stronghold to the French without firing a shot in its defence. The Fort was looted, and for two days an attempt was made to demolish it, which was only partially successful, for some of the walls resisted every effort, and are today all that remain of this historic fort.

**Churchill.**—In August, 1927, after extensive investigations, it was decided that Churchill should be the terminus of the Hudson Bay Railway instead of Port Nelson, chiefly on account of its better harbour facilities. By April, 1929, steel had been laid all the way to Churchill, and a temporary wharf and a few other buildings were erected. In 1928 ships began to arrive with timber, coal and other supplies, also instruments, masts and equipment for a wireless station. Today it is a modern harbour port, with huge storage grain elevators, stockyards to accommodate twenty car loads of cattle, and other up-to-date improvements. From this port a goodly portion of Western Canada's grain and livestock is shipped to European markets.



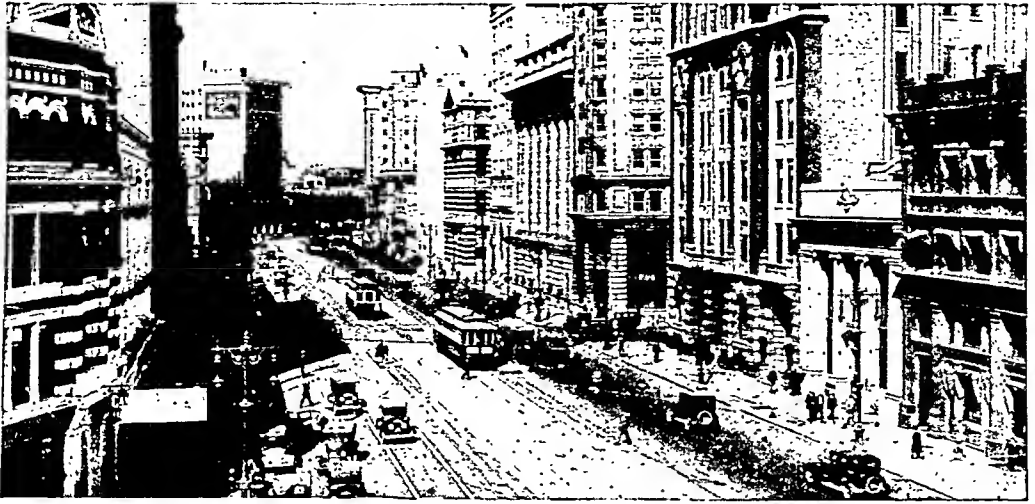
PARLIAMENT BUILDINGS, WINNIPEG

some five miles up the Churchill River in the year 1688. A second fort, also of wood, was built in 1718, but the depredations of French rivals of the Company caused them to construct a more formidable one of stone in 1733, the materials for which were secured nearby. The walls were originally designed to be forty-two feet thick, but were reduced to twenty-five feet. In 1782, when manned by a small force, the French disembarked four hundred troops

#### RIDING MOUNTAIN NATIONAL PARK

One hundred and seventy-three miles northwest of Winnipeg over all-weather highways; 2,200 feet above sea level. Luxuriant forests, crystal clear lakes, wild animal and bird life. Every facility for the comfort and enjoyment of the visitor. Hotels, lodges, cabin camps and camping grounds. Horseback riding, golf, tennis and other sports.





DOWN-TOWN WINNIPEG

#### THE WHITESHELL PROVINCIAL PARK

One hundred miles east of Winnipeg over hard-surfaced highways. Over one thousand square miles of natural scenic beauty. It contains some two hundred lakes and numerous streams of crystal clearness. Good fishing, hunting, and canoe trips. Cabin camps and camping grounds.

#### INTERNATIONAL PEACE GARDEN

A scenic area of 2,200 acres in Manitoba and North Dakota, with lodge and cabin camp ac-

commodation. Cabin camps are also available at nearby Lake Killarney.

#### LAKE WINNIPEG

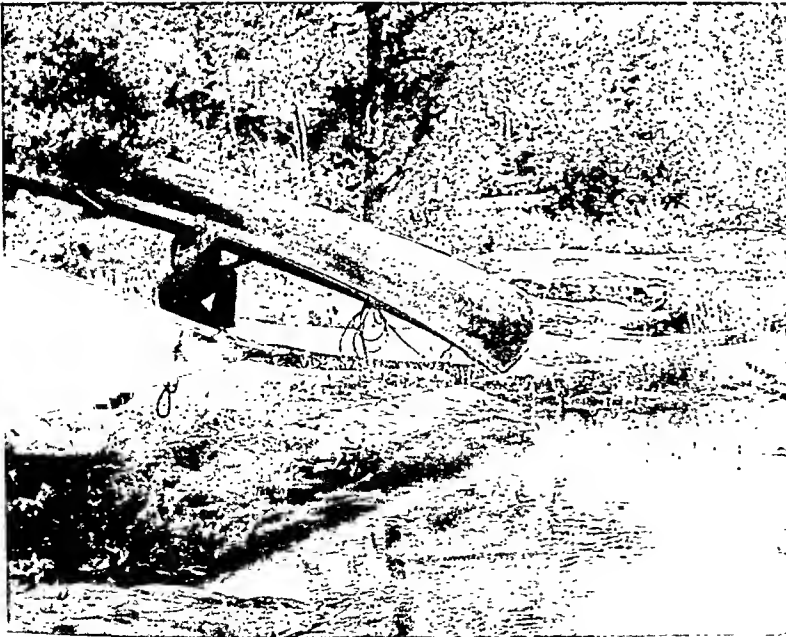
Fifty miles north of Winnipeg over hard-surfaced highways. Several fine resorts, including Winnipeg Beach, Sans Souci (Matlock), Grand Beach and Victoria Beach. Swimming, boating, golfing and other sports. Hotels, cabin camps, and camping grounds. Weekly boat trips on this lake from Winnipeg to Historic Norway House, one of the oldest Hudson's Bay Company trading posts in the west.

#### MINAKI, ONTARIO

One hundred and fourteen miles east of Winnipeg on the main line of the Canadian National Railways, and at the north end of the beautiful Lake of the Woods country. Good fishing, hunting, swimming, boating and golfing. Fine lodge accommodation.

#### KENORA, ONTARIO

On hundred and twenty-six miles east of Winnipeg on the main line of the Canadian Pacific Railway, 145 miles over hard surfaced highways. Over eight thousand population. Good fishing, hunting, swimming, boating, sailing, and golfing. Good hotel and cabin camp accommodation. Daily boat service between Kenora and Minaki during the summer season.



THE BEGINNING OF A PORTAGE



## By-Laws Governing Membership in and Attendance at Annual Meetings of the Canadian Medical Association

Now that all Provincial Medical Associations have become Divisions of the Canadian Medical Association the By-Laws for Divisions become applicable to Canada as a whole. It is well, therefore, that all members, both of the parent Association and of Divisions, clearly understand the basis of membership and annual meeting arrangements, including registration.

With that end in view, the following extracts from the By-Laws of the Canadian Medical Association are published.

### CHAPTER I — DIVISIONS

"A Branch Association may become a Division as outlined in Article V of the Constitution and enjoy all the rights and privileges of a Division in the following manner:

1. By intimating to The Canadian Medical Association in writing that it desires to become a Division.

2. By agreeing to amend where necessary its Constitution and By-Laws, to place them in harmony with the Constitution and By-Laws of this Association.

3. By agreeing to collect from all of its Divisional Members who desire to be members of The Canadian Medical Association such annual fee as may from time to time be set for membership and remit same to this Association.

4. By agreeing to take such steps as seem proper to the Division to increase membership in The Association."

### CHAPTER II, SECTION 9

#### REGISTRATION AT MEETINGS

"No member shall take part in the proceedings of the Canadian Medical Association, or in the proceedings of any of the sections thereof, or attend any part of the meeting until he has properly registered. Only members and invited guests are eligible to register and attend an annual meeting."

### CHAPTER IV — SECTION 2

#### ARRANGEMENTS FOR ANNUAL MEETINGS

"When the Canadian Medical Association meets in any province where there is a Branch Association or Division the meeting of that Branch Association or Division for that year shall be for business purposes only. The local arrangements shall be under the direction of the Executive Committee of The Canadian Medical Association, which may enlist the assistance of the Branch Association or Division or one of its component societies. The Canadian Medical Association assumes full control of the proceedings of the meeting and of all financial obligations save entertainment."

#### MEMBERSHIP

Medical practitioners in good standing resident in Canada may become members of the Canadian Medical Association in one of two ways:

#### *By-Laws, Chapter II, Section 1 — Ordinary Members*

Every member in good standing in a Division shall be automatically an Ordinary Member of the C.M.A. on payment of the annual fee as levied by the General Council.

#### *By-Laws, Chapter II, Section 2 — Members-at-Large*

Any graduate in medicine residing in Canada who is not a member of a Division may be accepted as a member of the C.M.A. provided that, with his application, a certificate of approval from the Executive body of the Division in which the applicant resides, be furnished to the General Secretary. In the case of an applicant residing in Canada in a territory beyond the jurisdiction of a Division the applicant must be endorsed by two members of the C.M.A. Such members shall be designated Members-at-Large and shall pay the annual fee as levied by the General Council.

## CONCLUSION

The foregoing extracts from the By-Laws, read in conjunction, make it clear that, applicable to all of Canada save that portion which is outside the jurisdiction of any province, all members of the Canadian Medical Association, whether ordinary members or members-at-large, must have the sanction of the Division in which the member resides.

Only members of the Canadian Medical Association may register at a meeting of the Canadian Medical Association and attend sessions.

The annual meeting of the Division which may be held at the same time and place as the annual meeting of the Canadian Medical Association is for business purposes only; and, as this meeting is entirely separate and distinct from the annual meeting of the Canadian Medical Association, membership in the Division only qualifies for registration to attend the business meeting of the Division.

## Amendment to Constitution and By-Laws

In order to make provision for alternates for elected members of the Executive Committee, the Committee on Constitution and By-Laws will move the following amendment to the By-Laws at the next meeting of General Council which will be held in Winnipeg on June 23 and 24, 1941. This Notice of Amendment is published in the *Journal* in compliance with the By-Laws (Chap. XII, Sect. 2).

*Chapter VI, Section 2 — Duties of Nominating Committee.*—Paragraphs 2 and 3 now read as follows:

(2) Nominations of an Executive Committee which, in addition to those who are members *ex officio* (See Chapter VIII, Section 4), shall consist of thirteen members drawn from General Council and geographically distributed as follows: three shall be resident in each province in which an office of The Association is located and one shall be resident in each of the other provinces.

At its session, the Nominating Committee may receive in writing a Division's official nomination of the candidate or candidates for representation on the Executive Committee to which the Division is entitled. In the event of an official nomination being rejected by the Nominating Committee the reasons for such action shall be incorporated in its report to General Council.

(3) *Rules of Procedure:* The Committee shall be called to order by the President as Chairman of the Committee. In the absence of the President the General Secretary shall convene the Committee and request the Committee to select, by open vote, the Chairman. The Committee shall then proceed to carry out its duties by open vote. In case of a tie vote the Chairman shall have the casting vote in addition to the vote to which he is entitled as a member of the Committee. When called for, the report of the Committee shall be presented to the General Council by the General Secretary.

The above-mentioned paragraphs shall be amended to read as follows:

(2) Nomination of an Executive Committee which, in addition to those who are members *ex officio* (See Chapter VIII, Section 4) shall consist of thirteen members drawn from General Council and geographically distributed as follows: three shall be resident in each province in which an

- office of The Association is located and one shall be resident in each of the other provinces.
- (3) Nomination from members of General Council of nine alternates for the elected members of the Executive Committee. There shall be one alternate nominated from each province. The function of the alternates shall be to act in the place of an elected member of the Executive Committee who is absent because of death or illness or from cause acceptable to the President.
- (4) At its session the Nominating Committee may receive in writing (1) each Division's official nomination of the candidate or candidates for representation on the Executive Committee to which the Division is entitled, and also (2) each Division's official nomination of one alternate who will act in the absence by reason of death or illness or from cause acceptable to the President of the member or one of the members representing that Division. In the event of such an official nomination by a Division being rejected by the Nominating Committee the reasons for such action shall be incorporated in its report to the General Council.
- (5) Rules of Procedure — (unchanged except the paragraph is renumbered.)

## The War

### National War Services

Major-General L. R. LaFlèche, National War Services, has sent in the following table of statistics relative to the medical examination of recruits which is valuable for record, as it contains very important information.

Number of men tabulated: 10,000.

Category	A	6,905	Per cent	69.05
B1	904	9.04		
B2	236	2.36		
C1	293	2.93		
C2	383	3.83		
D	112	1.12		
E	1,167	11.67		
Canadian-born	9,672	96.72		
British-born	175	1.75		
Non-British-born	153	1.53		

It will be noted that the total number of disabilities shown does not coincide with the total number of men examined. The explanation is that some men are free of any disability whilst others suffer from one or more.

Rheumatism	585	5.85
Tuberculosis	74	0.74
Bronchitis, asthma	563	5.63
Heart disease	257	2.57
Kidney, bladder	270	2.70
Stomach, intestinal	844	8.44
Rupture	442	4.42
Varicose veins	129	1.29
Foot trouble	836	8.36
Nasal trouble	634	6.34
Ear trouble	564	5.64
Eye disease	595	5.95
Fits	82	0.82
Mental and nervous	195	1.95
Syphilis	17	0.17
Gonorrhoea	130	1.30
Glasses	1,414	14.14
Previously rejected for military service	340	3.40
In receipt of pension	17	0.17
Wear dentures	352	3.52

Average height ..... 5 ft. 7 in.

Average weight ..... 146.97 lbs.

15th March, 1941.

Since English hearts again have need of me  
I cannot be at peace in Avalon;  
But I, according to the prophecy,  
Have come among them, as in days long gone,  
And walk with them again the ancient road  
They travel, to the glory of their God.

HARRIET D. RICHARDSON.

(Reprinted from the *New York Weekly Times*)

## Medical Societies

### The Regina and District Medical Society

Captain Douglas Taylor, of Montreal, addressed the April meeting of the Regina and District Medical Society on "Arthritis".

He said that arthritis is a whole family of diseases; there are at least twenty different kinds. The medical profession is to blame for the attitude of hopelessness. The teaching regarding rheumatic diseases is poor in Canada. In the United States \$200,000,000 is spent on quacks each year for the treatment of these conditions. There are more of these cases than there are of tuberculosis, cancer and heart trouble put together. He showed slides illustrating various kinds of arthritis, also slides showing the use of plaster casts. In addition to casts he uses heat, gentle massage (no massage in acute states), good diet, iron and vitamins. Fat people are reduced.

Captain Taylor considered a certain Ontario centre where many arthritis patients go to have feet twisted, a blot on the medical history of Canada. He condemned the use of Crowe's vaccine in clear unmistakable terms. In fact he is dubious that vaccines have any value in arthritis. He also condemned "Ertron" and wished something could be done to stop the advertising that goes out about it. Ridiculously high doses of vitamin D came under his displeasure. He warned against missing

### U.S. Health Unit and Liaison Officer

With the consent of the President of Harvard University, Dr. J. E. Gordon, who holds the Charles Wilder Chair of Preventive Medicine and Epidemiology at Harvard, has accepted Mr. Malcolm MacDonald's invitation to act as United States Liaison Officer with the Ministry of Health. Shortly after the outbreak of war Harvard University appointed a committee to consider how the university could contribute material or professional help to a cause closely concerned with its interests. The possible nature of this help was conceived in the broadest terms, with the suggestion that it might be in economics, medicine, sociology, public health, law, and perhaps other fields. Through an exchange of opinion between authorities of Harvard and colleagues in Great Britain it later became evident that help in the fields of public health and medicine was most clearly in point. As a consequence Harvard University made a formal offer to the Minister of Health, which Mr. MacDonald gratefully accepted, to equip and maintain in Great Britain a public health unit for the study and control of communicable disease. The purposes of the unit were defined as: (1) to lend material

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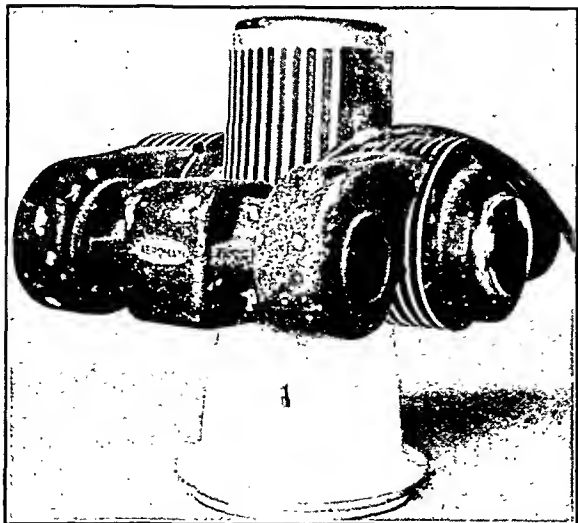
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"When the Canadian Medical Association meets in a Branch Association..."

## Damage to X-ray Apparatus from Bombing

The accompanying illustration shows a portable x-ray tube which has been subjected to "enemy action" in England. The mobile x-ray



unit to which it belonged was almost completely destroyed but the tube was rescued. It was somewhat marked by its experience, as may be seen, but was still in good working order.

This tube, which was designed and made by the Maehlett Laboratories in the United States, is an excellent example of the great improvements in modern x-ray design. The tube which used to be the most fragile element in an x-ray unit is now enclosed in an aluminium housing lined with lead and immersed in oil. These measures not only protect the operator from shock and burn, but help to cool the tubes and cushion it against jarring.

We understand that there are many such tubes in use in England.

### A.R.P. in Germany

Air-raid precautions have been prominent in the minds of most citizens in this country, both civil and medical, for the last year or so. A long article by Professor Anschütz, of Kiel, gives an interesting glimpse of the medical side of A.R.P. in Germany. Apparently the German plan is to transport the wounded in ambulances and other vehicles to stations in which a good deal of treatment may be done. "Rettungsstellen" seem to correspond to casualty clearing stations rather than to our conception of first-aid posts. When the vehicle arrives an "energetic and experienced" medical officer enters it and selects the cases which shall be treated at the post, leaving the others undisturbed to be taken to hospital. The facilities for operation are by no means equal to those in hospital, but they are much greater than we regard as desirable in this country. He prepares those who are to remain for treatment in the dressing-room or theatre. His is therefore the most difficult task, perhaps the most responsible of all, and the author thinks that it should be undertaken by the chief officer of the station. Before even the first lorry arrives the station may be besieged by walking wounded, and the staff must never relax their vigilance in periods between raids. Instruments, gloves, and bandages must be ready in sterilized parcels, and the station ready to go instantly into action. He warns the staff against yielding to a temptation to detain particularly interesting cases; they occupy far too much time, during which the lighter cases pile up and congest the waiting-rooms. The relief of pain is an important part of first-aid, and he considers the best drug for this purpose to be the "S.E.E." mixture—scopolamine, eucodal, and ephedrine. A weak solution is injected intravenously until the patient becomes drowsy; with this procedure there is little risk of an overdose. With subcutaneous injection it is unsafe to give more than one ampoule. If the patient is badly shocked, small doses should be given at frequent intervals. Professor Anschütz reminds readers that to be prepared may not be everything, but it is a very large in-

redient of success. The work of the station will be done under the public eye, and critics will abound; an adequate performance depends on every member of the staff being ready and doing his best. This counsel applies equally to our own organization. The German medical services are probably being tested already.—*Brit. M. J.*, 1940, 1: 1025.

### War Literature

#### ANNALS OF INTERNAL MEDICINE

Developments in Aviation Medicine, H. G. Armstrong, 1940, 13: 2212.

#### ARCHIVES OF SURGERY

Improvement in Blood Transfusion Service, P. Hoxworth and C. Skinner, 1941, 42: 480 and 498.

#### BRISTOL MEDICO-CHIRURGICAL JOURNAL

Head Injuries in Wartime, F. W. Willway, 1940, 57: 91.

#### THE BRITISH MEDICAL JOURNAL

Some recent Air-raid Casualties, Margaret Ball and George Quist, 1941, 1: 273.

Technique for Fastening a Casualty on an A.R.P. Stretcher with Triangular Bandages, 1941, 1: 280.

Chemoprophylaxis of Gas Gangrene, 1941, 1: 282.

Chemotherapy and Wound Infection (Society meeting), 1941, 1: 288.

Depressive States in War, D. Curran and W. P. Mallinson, 1941, 1: 305.

Treatment of Air-raid Casualties, P. H. Mitchiner, 1941, 1: 309.

#### CANADIAN MEDICAL ASSOCIATION JOURNAL

Some Aspects of Aviation Medicine, R. W. Ryan and G. E. Hall, 1941, 44: 227.

#### EDINBURGH MEDICAL JOURNAL

War and Skin Disease, G. H. Percival, 1941, 48: 73.

#### THE LANCET

Overtime and Overtiring (leading article), 1941, 1: 181.  
Chemotherapy of Gas Gangrene: Material and Methods—experimental, J. McIntosh and F. R. Selbie, 1941, 1: 240.

Elimination of Streptococci from Superficial Wounds by Sulfanilamide Powder, L. Colebrook, 1941, 1: 271.  
The Stretcher Patient Secured, 1941, 1: 289.

#### N.Y. STATE JOURNAL OF MEDICINE

Medical Problems of Diving and Submarines, L. W. Johnson, 1940, 40: 1065.

#### BOOKS AND PAMPHLETS

Surgery of Modern Warfare. Part I. Hamilton Bailey. 160 pp. E. & S. Livingston, Edin., 1940. Price 13s.

Industrial Hygiene, A. J. Lanza and J. A. Goldberg, Oxford University Press, London, 743 pp. Price 42s.

Health and Efficiency of Munition Workers, H. M. Vernon, Oxford University Press, London, 138 pp. Price 5/6.

Bulletin of War Medicine, 1941, No. 3 (very valuable). H. M. Stationery Office, York House, Kingsway, London W.C.2. Price 2/6 net.

Special Surgery in War Time. Edited by Sir Humphry Rolleston and Alan Monierieff, Eyre Spottiswoode, London. Price 6s.

### KING ARTHUR SPEAKS

I come again, my England, from the vale  
Of Avalon, and stand upon the shore  
Where once I ruled. I hear again the roar  
Of Cornish waves, and in my shining mail  
I listen through their thunder to the wail  
Of wrongs I have but power to deplore.  
A knight in armor is a force no more.  
And few are left who seek the Holy Grail.

Since English hearts again have need of me  
I cannot be at peace in Avalon;  
But I, according to the prophecy,  
Have come among them, as in days long gone,  
And walk with them again the ancient road  
They travel, to the glory of their God.

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LILLIAN A. CHASE

### The Royal College of Physicians and Surgeons of Canada

The eleventh Annual Meeting of the Royal College of Physicians and Surgeons of Canada was held in the Auditorium of the National Research Council Building, Ottawa, on Saturday, October 26, 1940. One hundred and forty-six Fellows registered.

At a meeting of the Council held in June, 1940, it was decided to create annual lectureships, two in English and one in the French language, and to present to these lecturers special diplomas at the Annual Meeting. The lecturers are to be known as "The 1940 Lecturer of The Royal College of Physicians", "The 1940 Lecturer of the Royal College of Surgeons" and "Conférencier du Collège Royal des Médecins et Chirurgiens pour l'année 1940" as the case may be; a primary presentation of the English lectures to be made at each annual meeting of the College. The lecture in the French language to be given at an appro-

appropriate meeting, not necessarily organized by the Royal College. It was furthermore provided by Council that the formal lectures given at the Annual Meeting might be repeated as secondary Royal College Lectures at some point east of Montreal and west of Toronto. The question of whether these secondary lectures should be given this year, for example in Halifax to the east and in Winnipeg or Vancouver to the west, was discussed and decided in the negative.

In accordance with the above resolution the following scientific program was presented.

A. H. Gordon, M.D., C.M., D.C.L., F.R.C.P. (C), Montreal, 1940 Lecturer. "Recent advances in medicine—etiology and therapy." Commentary by James Douglas Adamson, M.D., Winnipeg.

W. E. Gallie, M.D., F.R.C.S. (Eng.), F.R.C.S. (C), F.A.C.S., Toronto, 1940 Lecturer. "Recent advances in surgery—wound healing." Commentary by Wilfred Alan Curry, M.D., Halifax.

A lecture entitled "L'histoire de la transfusion" was given at the meeting of the French Congress at Three Rivers, P.Q., on Monday, September 9th, by Léo Errol Pariseau, M.D., D.P.H., D.Sc., F.R.C.P. (C), of Montreal.

After a short recess the Annual Business Meeting of the College was convened, with the President, Dr. Wilder G. Penfield in the Chair.

Dr. Albert LeSage, Vice-president, Division of Medicine, presented to the President the candidates qualified, by examination, to receive Fellowship in the Royal College of Physicians of Canada; Dr. Arthur Edwin Blackett, New Glasgow, N.S.; Dr. Walter Bethune Carruthers, Sarnia, Ont.

Dr. John A. Gunn, Vice-president, Division of Surgery, presented to the President the candidates qualified by examination to receive Fellowship in the Royal College of Surgeons of Canada: Dr. Frederick Douglas Ackman, Montreal; Dr. Gordon Charles Johnston, Vancouver; Dr. Neil MacDonald, Windsor, Ont.; Dr. Richard MacGregor Parsons, Red Deer, Alta.

Of nine applications for *Ad eundem* Fellowship two were acted upon favourably, and Fellowship in the Royal College of Surgeons of Canada was granted to the following: Dr. Robert Clarence Laird, B.A., M.S., F.R.C.S. (Eng.), Toronto; Dr. Donald Colin MacRae, F.R.C.S. (Edin.), Regina.

*Lectureship Diplomas* were awarded to: Dr. Alvah Hovey Gordon, 1940 Lecturer of the Royal College of Physicians of Canada; Dr. William Edward Gallie, 1940 Lecturer of the Royal College of Surgeons of Canada; Dr. Léo Errol Pariseau, Conférencier du Collège Royal des Médecins et Chirurgiens pour l'année 1940.

*Honorary Fellowship* in the Royal College of Physicians of Canada and Honorary Fellowship in the Royal College of Surgeons of Canada was conferred upon: The Right Honourable Alexander Augustus Frederick George, Earl of

Athlone, K.G., P.C., G.C.B., G.C.M.G., G.C.V.O., D.S.O., A.D.C., Governor-General and Commander-in-Chief of the Dominion of Canada.

With the Fellows standing the names of those deceased during the year were read by the Honorary Secretary.

*Physicians.*—The Right Honourable Lord Tweedsmuir, February, 1940; Dr. J. J. Langlais, Trois Pistoles, November, 1939; Dr. A. H. W. Caulfeild, Toronto, May, 1940; Dr. J. F. Fotheringham, Toronto, May, 1940; Dr. J. G. FitzGerald, Toronto, June, 1940; Dr. A. J. Douglas, Winnipeg, June, 1940; Dr. F. G. Finley, Montreal, July, 1940; Dr. Maude E. Abbott, Montreal, September, 1940; Dr. W. B. Almon, Halifax, September, 1940.

*Surgeons.*—The Right Honourable Lord Tweedsmuir, February, 1940; Dr. W. H. Smith, Winnipeg, April, 1939; Dr. Gilbert Royce, Toronto, May, 1939; Dr. A. R. Campbell, Yarmouth, N.S., March, 1940; Dr. P. C. Dagneau, Quebec, July, 1940; Dr. J. McKenty, Winnipeg, August, 1940; Dr. F. Bertrand, Sherbrooke, P.Q., February, 1940.

A report of the activities of the Council during the year was presented by the President.

Meetings had been held in Toronto, on June 17th, and again in Ottawa (three sessions) at the time of the annual meeting.

The annual examinations were held as follows. Written examinations on September 30th, October 1st and October 2nd. Oral and clinical examinations took place in Edmonton on October 21st, and in Montreal on October 24th and 25th.

Of the thirty-two candidates who tried the Primary Examinations there were eight who took the French Examinations. There were no French candidates in the final examinations. The names of the successful candidates are as follows: Dr. Brock M. Fahrni, Winnipeg; Dr. John Wallace McNichol, Hamilton; Dr. Harold L. Richard, Edmonton; Dr. William Shandro, Vegreville, Alta.; Mr. Robert G. Bell, Toronto; Mr. Robert H. Cram, London; Mr. Robert W. Dingwall, Kingston; Mr. Armand Genest, Montreal; Mr. Robert Genest, Montreal; Mr. Jean Grignon, Montreal; Mr. George L. Ingham, Stratford, Ont.; Miss Madeline Longtin, Saint Philippe, P.Q.; Mr. Gerard G. Lippert, Kitchener; Mr. Andre Mackay, Montreal; Miss Jeanne H. Montgomery, Toronto; Mr. Leonard G. Roussel, Ottawa; Mr. David B. Stark, Toronto; Mr. George C. Walsh, Montreal.

The following physicians and surgeons were admitted to Fellowship: Profs. Edmond Dubé, Gaston Lapierre, Emile Legrand, Paul Letondal, Albérie Marin, Roméo Pepin, Ernest Prud'homme, Louis P. Sénécal, Sylvio Caron, Gustave Desrochers, Emile Fortier, Jean B. Jobin, Lucien LaRue, Joseph L. Petitclerc, Paul Garneau.

The following calendar for 1941 has been agreed to.

June meeting of Council, Winnipeg, Monday, June 23rd.

Annual Meeting, Ottawa, Saturday, October 25th.

Written examinations, Monday, September 29th; Tuesday, September 30th; Wednesday, October 1st.

Oral and clinical examinations. Montreal, Tuesday, October 21st and Wednesday, October 22nd. Toronto, Thursday, October 23rd and Friday, October 24th.

The Annual Dinner was held at the Chateau Laurier. His Excellency the Governor-General, was the guest of the College and addressed the Fellows after the dinner.

### La société médicale des hôpitaux universitaires de Québec

Cette société tenait une assemblée, le 21 février, 1941, à l'Hôpital du St-Sacrement, Québec.

Suivent des résumés.

### UN CAS DE FIBROME DU MAXILLAIRE INFÉRIEUR.— J. Paul Roger et J. M. Lemieux.

Le 22 octobre 1940, une malade âgée de 23 ans, consulta pour une tuméfaction du maxillaire inférieur qui était apparue trois semaines auparavant. Une radiographie fut faite qui montra une image par soustraction qui comprenait presque toute la hauteur de la branche horizontale du maxillaire inférieur. On fit une résection partielle du maxillaire inférieur et l'examen anatomopathologique de la tumeur révéla qu'il s'agissait d'un ostéo-fibrome.

Les ostéo-fibromes sont des tumeurs plutôt exceptionnelles; au maxillaire inférieur où on les rencontre le plus fréquemment ils ne constituent que 3 pour cent de toutes les tumeurs.

On distingue des fibromes centraux et des fibromes périphériques; celui de cette malade était un fibrome central.

Les résultats opératoires furent excellents. La partie enlevée s'est reformée aux dépens du périoste et l'impotence est à peu près nulle.

Il y eut présentation de la patiente.

### ANESTHÉSIE AU PENTOTHAL CHEZ UN HÉROÏNOMANE.—Adrien Paquet.

Nous avons eu l'occasion d'observer l'effet combiné des associations narcotiques en donnant du pentothal à un héroïnomane qui recevait 40 grs. d'héroïne par jour. L'anesthésie a été parfaite avec une dose de pentothal ordinaire, soit 6 c.c. Pour obtenir ce résultat la vitesse d'injection du pentothal a été doublée: le malade a reçu une injection de la solution à 10 pour cent de pentothal, au rythme de 2 c.c. par cinq chiffres comptés par le malade en 5 secondes, la vitesse d'injection régulière étant de 1 c.c.

De cette observation se dégage les remarques suivantes: Il existerait une dose d'efficacité minima pour le pentothal, dose individuelle, variable avec les médications préliminaires et les anesthésiques de base. Pour obtenir cette dose d'efficacité minima la vitesse d'injection ne doit pas être trop lente sans quoi l'anesthésie sera imparfaite. Chez ce malade, la toxicité à l'héroïne ne semble pas avoir influencé la réceptivité aux barbituriques. Il est logique de croire que les associations anesthésiques augmentent l'anesthésie sans que s'additionnent les toxicités.

La localisation des centres de la narcose serait aux pédoncules cérébraux. Les anesthésiques pour produire la narcose doivent inhiber les pédoncules de façon directe, comme le pentothal, ou de façon indirecte, comme l'éther, qui agit d'abord sur l'écorce cérébrale pour donner la période d'excitation, avant d'obtenir l'anesthésie chirurgi-

cale, par action secondaire et par dosage plus élevé sur les pédoncules cérébraux.

L'absence d'action du pentothal sur l'écorce cérébrale et son action directe sur les pédoncules expliqueraient l'absence de période d'excitation au cours de l'anesthésie au pentothal.

### LARYNGITE CATARRHALE AIGUE ET CORPS ÉTRANGER. —Marcel Langlois.

L'observation présentée est celle d'un enfant d'un an qui a aspiré un corps étranger, en l'espèce une punaise de dessinateur à l'insu de ses parents et des médecins.

Les symptômes qu'a présentés l'enfant étaient ceux d'une trachéite avec bronchorrhée purulente. Elle était associée à une contracture douloureuse en episthotonos et une souffrance continuelle diurne et nocturne de la part de l'enfant. La présence d'un corps étranger a été involontairement révélé au cours d'un examen radiologique pulmonaire destiné à déceler une pneumopathie. L'aire radiologique a dépassé les régions habituelles considérées dans les examens pulmonaires et nous a permis d'apercevoir le corps étranger au niveau présumé du larynx. L'abcès pré-vertébral qui expliquait les symptômes, douleurs, contractures et bronchorrhée n'est, qu'une complication nécessaire de la pénétration de ce corps étranger. Cette observation a le mérite d'illustrer qu'il ne faut pas toujours limiter les recherches radiographiques au territoire limité par la clinique.

### CONSIDÉRATIONS SUR TROIS CAS DE MALADIE D'ADDISON.—R. Lemieux et A. Martel.

Des trois malades qui font l'objet de cette communication et qui ont présenté chacun une maladie d'Addison typique, deux moururent malgré une thérapeutique par l'hormone cortico-surrénale et la réchloration. A l'autopsie on trouva dans les deux cas une tuberculose caséuse des deux glandes surrénales.

Les signes humoraux que nous avons constatés chez ces trois malades ont présenté des variations souvent contradictoires. En général, dans la maladie d'Addison, les modifications de l'équilibre humoral sont constantes et elles permettent le dépistage précoce des états d'insuffisance surrénale fruste ou la confirmation d'un addisonisme douteux.

Ces modifications humorales portent sur le chlore, le sucre, le sodium, le potassium, le cholestérol, l'urée et le glutathion. La glycémie est habituellement basse. Mais plus encore que cette hypoglycémie isolée, l'hyposensibilité à l'insuline doit être considérée comme caractéristique de la maladie d'Addison. La concentration du chlore globulaire et plasmatique baisse considérablement, tandis que l'élimination de ce corps par les urines est augmentée. On note, en même temps, une baisse appréciable du taux du sodium et du calcium sanguins, ainsi que de la réserve alcaline. L'augmentation du potassium sérique est un phénomène constant chez les addisoniens. La suppression du chlorure de sodium de l'alimentation d'un addisonien ou l'augmentation de l'apport de potassium provoquent l'apparition de phénomènes graves. Cette restriction du NaCl, avec administration de potassium, est à la base des épreuves dont on se sert pour le diagnostic de la maladie d'Addison. On considère qu'une concentration du chlore plasmatique de moins de 121 mgm. par 100 c.c. et une concentration urinaire de plus de 225 mgm. de chlore par 100 c.c. sont fortement en faveur d'une maladie d'Addison. Une élévation de l'azotémie, un abaissement du taux du cholestérol sanguin et du glutathion, un abaissement du métabolisme basal ainsi que du taux d'élimination urinaire de la vitamine C, sont des constatations très fréquentes dans cette maladie.

Les principaux éléments du traitement sont: l'hormone cortico-surrénale, à doses élevées: 5 à 20 c.c. par jour. La réchloration sous forme de chlorure de sodium per os ou de sérum hypertonique salé par voie veineuse. La vitamine C, à hautes doses: 1 gramme par jour, per os ou par voie intra-veineuse. Régime pauvre en potassium.



### Winnipeg Medical Society

The program of the regular monthly meeting of the Winnipeg Medical Society on March 21st was contributed by the Medical History Section of the Society. Dr. J. C. Hossack gave a scholarly introduction, pointing out the value of medical history and showing how medical events had affected the course of history. Dr. W. A. Gardiner spoke on the "Edwin Smith Papyrus"; Dr. J. D. Adamson on "Sydenham"; and Dr. Ross Mitchell on "Organization of Medical Services in the Rebellion in 1885", illustrated with slides.

ROSS MITCHELL

## Abstracts from Current Literature

### Medicine

**The late Results of Artificial Pneumothorax in Pulmonary Tuberculosis.** Clarke, B. R. and Erskine, S. L. W.: *Quart. J. Med.*, 1940, 9: 323.

Artificial pneumothorax was applied to the treatment of 400 tuberculous patients at the Forster Green Hospital (Ireland) during the years 1925 to 1933 inclusive, and 99 per cent of the cases were followed up for a minimum period of five years. Ninety-seven per cent had tubercle bacilli in the sputum and 88 per cent showed x-ray evidence of cavitation. The youngest patient was 14 and the eldest 55 years of age, and there was approximately equal sex distribution. Satisfactory collapse was obtained in 33 per cent, partial collapse in 46 per cent, and no collapse in 21 per cent.

It was found that the good results of artificial pneumothorax were almost entirely limited to those cases in which a good collapse was obtained. The patients with an unsatisfactory collapse fared worse, from a mortality standpoint, than those in whom collapse could not be obtained, and the authors conclude that artificial pneumothorax should be discontinued as soon as it is evident that a good collapse is unattainable. Artificial pneumothorax was more successful, the earlier it was instituted after onset of illness (55 per cent within 6 months, 20 per cent after 12 months).

One hundred and eighty-one of the 400 patients had phrenic evulsion done on the same side as the pneumothorax (18 per cent of cases during the first five years of the series and 62 per cent during the final three years). The results were much improved during the final three years and this improvement was attributed to the phrenic evulsion.

NORMAN S. SKINNER

**Cancer of the Stomach.** Gray, H. K.: *Proc. Staff Meet., Mayo Clinic*, 1941, 16: 65.

La gravité du cancer de l'estomac a été bien démontrée par l'excellent travail de Living-

ston et Pack, qui démontre que la mortalité causée par le cancer de l'estomac est deux fois et demie plus élevée que la mortalité totale occasionnée par toutes les guerres auxquelles ont participé les Etats-Unis. Le seul traitement curateur jusqu'à date d'aujourd'hui est l'intervention chirurgicale et la résection gastrique. Malheureusement il persiste chez le public et aussi chez plusieurs membres de la profession médicale une attitude de négligence à l'égard de "*symptômes gastriques persistants*" et une attitude d'attente "*d'histoire clinique dite classique*" qui fait faire le diagnostic lorsqu'il est trop tard.

Le cancer latent de l'estomac est heureusement rare et la plupart du temps hors de toute thérapeutique. L'enseignement à ce sujet doit être modifié et doit s'inspirer autant pour le médecin que pour le public, de principe suivant: La nécessité de consulter pour tout trouble digestif, quelque vague qu'il soit, ne répondant pas rapidement à la thérapeutique habituelle ou nécessitant constamment un traitement; de plus et ceci regarde spécialement le médecin, le devoir qu'a celui-ci de faire ou de demander des examens complets afin d'arriver à un diagnostic précis. D'après l'auteur un deuxième facteur de mortalité élevée par néoplasme gastrique est l'ignorance du fait suivant: "la malignité en puissance" d'un ulcère gastrique qui peut et dans une proportion assez importante subir un processus de dégénérescence maligne.

Le diagnostic clinique et radiologique est difficile et doit se baser sur les faits suivants: (1) la disparition de la douleur et des hémorragies cliniques ou microscopiques. (2) La disparition de la niche—signes sur lesquels Eusterman et Balfour ont insisté—semblent favoriser la bénignité d'une lésion. Mais il ne faut pas oublier que la "niche" peut paraître guérie radiologiquement même en présence d'une transformation maligne. C'est pourquoi l'auteur préconise la résection gastrique quand cela est possible chez les ulcéreux gastriques ou l'observation et le contrôle médical très sévère à l'hôpital.

YVES CHAPUT

### Surgery

**The Surgical Treatment of Carcinoma of the Thoracic Oesophagus.** Garlock, J. H.: *Surg. Gyn. & Obst.*, 1940, 70: 556.

Ces cancers ne sont opérés surtout que depuis 4 ou 5 ans, le petit nombre des cas opérés, de 15 à 20, semble dû à la réputation de haute gravité de cette chirurgie. Jusqu'à récemment, considéré comme fatal, ce cancer, n'était traité que par la gastrostomie, associée ou non à la radiothérapie, avec une survie de 6 mois à un an.

Un diagnostic précoce, une préparation préopératoire méticuleuse, une technique basée sur les conceptions actuelles de la chirurgie du

cancer, un anesthésiste de haute compétence, des soins post-opératoires non moins méticuleux, le traitement immédiat des complications post-opératoires éventuelles peuvent abaisser la mortalité de façon notable comme en témoignent les 10 cas opérés par l'auteur, dont 6 publiés antérieurement et 4 cités à la fin du présent travail.

Diagnostic précoce: l'amaigrissement et une gêne à la déglutition chez une personne passée 35 ou 40 ans doivent commander une radiographie et une biopsie. Une alimentation riche en calories, des liquides en abondance, une hygiène buccale sévère, des transfusions, sont essentiels avant l'opération.

Si le cancer est situé dans les deux tiers supérieurs de l'œsophage, on doit pratiquer une gastrostomie préalable. S'il est situé au tiers inférieur, l'œsophagogastronomie en un temps est indiquée, mais sans pratiquer de pneumothorax avant l'opération. Par contre, l'anesthésie doit être soigneusement contrôlée en rapport avec la pression pleuro-pulmonaire. Pour le choix de l'opération deux cas à considérer: le cancer situé dans les deux tiers supérieurs et celui du tiers inférieur.

Après extirpation d'un segment supérieur de l'œsophage il est impossible, pour des raisons anatomiques rappelées par l'auteur de suturer avec chance de succès les deux tranches de l'œsophage. Il faut se contenter de l'excision trans-thoracique et de l'extirpation par voie sus-claviculaire suivie plus tard d'un rétablissement du conduit œsophagien extra-thoracique par le truchement d'un tube en caoutchouc introduit en haut à l'extrémité cervicale de l'œsophage sectionné et en bas à la bouche de gastrostomie.

Pour les cancers situés sur le segment œsophagien inférieur (2 ou 3 derniers pouces), et qui font surtout l'objet du présent travail, on doit s'efforcer de réaliser l'anastomose gastro-œsophagienne terminale-latérale par voie intra-thoracique et incision du diaphragme.

PETER SMITH

#### **Surgical Approach to the Proximal End of the Radius and its Use in Fractures of the Head and Neck of the Radius.** Kaplan, E. B.: *J. Bone & Joint Surg.*, 1941, 23: 86.

The author describes an approach to the head of the radius with careful detail of anatomical structures and their relations, especially to the posterior branch of the radial nerve. The excision extends for about 3 inches, centred at the radio-humeral joint, and in the plane of the lateral intermuscular septum. With the patient prone, the forearm placed in full pronation, the incision deepens between the extensores radialis brevis and longus and the extensor digitorum longus to the orbicular ligament. On section of this ligament, the head of the radius and lateral aspect of the elbow joint are exposed. The radial nerve is safely away from the operation

site, being approximately 2 inches below the articular surface of the radius laterally, and  $2\frac{3}{4}$  inches posteriorly, in young patients and relatively more in adults. In the supinated position of the forearm, the nerve is considerably nearer the radial head and neck. Anatomical dissections illustrate the operative approach. This is an excellent surgical approach to the head of the radius which the reviewer has routinely used for some years. H. F. MOSELEY

#### **Obstetrics and Gynecology**

##### **Oral Pregneninone in the Treatment of Spontaneous Abortion.** Krohn, L. and Harris, J. M.: *Am. J. Obst. & Gyn.*, 1941, 41: 95.

A series of 50 patients with threatened and habitual abortion were treated with oral pregnenolone (anhydro-hydroxy-progesterone) and there were only eight failures. The results obtained with oral pregnenolone compare favourably with and closely approximate those obtained using progesterone in oil. Oral pregnenolone, although not so potent milligram for milligram as progesterone, presents numerous advantages. No undesirable or toxic effects as a result of the administration of this drug were noted. Oral pregnenolone is of distinct value in the treatment of threatened and habitual abortion. ROSS MITCHELL

##### **A Contribution to the Study of Human Fertility.** Pryde, J.: *Brit. M. J.*, 1941, 1: 12.

Data are given from two cases in which the dates of menstruation and of all acts of intercourse were recorded throughout periods of two and three-quarter and five years respectively. In the former case a total of 126 and in the latter case a total of 450 uncontracepted acts were distributed throughout thirty-three and sixty-one consecutive intermenstrual cycles, respectively, at such times that no one of these cycles fell within the tenth to the thirteenth day of the cycles. No pregnancy resulted. On the other hand, when pregnancy was desired it was immediately achieved in both cases following the first uncontracepted acts falling within the tenth to the thirteenth day of the thirty-fourth and sixty-second cycles respectively. These results point to an existence in the cases described of a limited period of fertility within the menstrual cycle, and afford support for the view that such behaviour may be of more general occurrence. ROSS MITCHELL

#### **Ophthalmology**

##### **Treatment of Inclusion Conjunctivitis with Sulfanilamide.** Thygeson, P.: *Arch. Ophthalm.*, 1941, 25: 217.

The virus disease known as "inclusion conjunctivitis", or inclusion blennorrhœa, is an etiological entity which appears in the newborn infant typically as severe papillary conjunctivitis and in the adult as follicular conjunctivitis, with acute or subacute onset. The



disease, whether in the adult or in the newborn infant, heals spontaneously after running a course of at least several months.

In a series of 52 cases observed by Thygeson, the conjunctiva had never returned to normal in less than three months, and had required from four to five months in the majority of cases. After the report by Loe that sulfanilamide had proved effective in the treatment of the related virus disease, trachoma, the drug was tested in cases of inclusion conjunctivitis. In Thygeson's series sulfanilamide proved effective in causing rapid healing of inclusion conjunctivitis in infants and adults, as well as of the experimental disease in monkeys and baboons. Adults with predominant papillary hypertrophy responded more rapidly than those with predominant follicular hypertrophy. The characteristic epithelial cell inclusions could always be demonstrated during the first two days of therapy, but could not be found after the third day. Infectivity of epithelial scrapings for baboons also disappeared during treatment.

S. HANFORD MCKEE

**Subjective "Lightning Flashes".** Moore, R. F.: *Am. J. Ophthalm.*, 1940, 23: 1255.

The writer previously reported on this symptom-complex, and now furnishes details of 33 additional cases.

The symptom consists of the occurrence of flashes of light, most often likened by the patient to lightning; they are usually vertical in direction, and referred to the temporal side, and are accompanied by the simultaneous development of opacities in the vitreous. They are more common in women. Among the 33 cases, 26 were in women, and this disproportion would seem sufficiently great to indicate a real sex difference. They seldom occur before middle-age, for of the present group 3 patients only were under the age of 50 years, the average being just over 60 years.

The chief importance of the symptom lies in its recognition and the realization that it is not of serious import, nor is it the forerunner of some more serious development. The author feared at first that it might be an indication of vascular disease, retinal detachment, an early neoplasm, or some other malady in the incipient stage. It is a symptom-complex that does not carry any serious implication, either at the time or for the future; it is not a manifestation of migraine.

S. HANFORD MCKEE

## Neurology and Psychiatry

**Psychiatric Casualties in London, September, 1940.** Pegge, G.: *Brit. M. J.*, 1940, 2: 553.

This brief report is intended to show that psychiatric war casualties have occurred, though to a surprisingly small extent so far, probably because a year of war has eliminated by evacuation many neurotic or potentially

neurotic people. In discussing the neuroses of war, whether in the armed forces or in the civilian population, there has been much argument as to what cases can truly be said to have been caused by war-stress, and the idea has become prevalent that if a patient has shown the least sign of neurosis in his previous history he cannot rightly be called a war neurotic. The author believes that his clinical material reveals how superficial such an argument is. He points out that there is no absolute dividing line between neurotic and non-neurotic and that probably every one has some trace of neurotic reaction in his adjustment to reality. Therefore, any distinction must be quantitative rather than qualitative. In assessing the war-factor as a precipitating cause of florid neurotic illness it must be decided to what extent any previous neurosis is responsible, jointly with present stress. In this series of 29 cases 9 had a history of pre-existing neurotic illness; 10 had no such history but were said to have been nervous and high strung; 3 showed no discoverable predisposing factors, four showed mild psychotic or psychopathic personalities; 2 were complicated by concussion, and 1 refused examination. Six typical cases are outlined.

The method of treatment is described. Six were treated successfully as out-patients and ten successfully as in-patients in three days. The result of treatment refers only to its effect on the acute incapacitating symptoms.

G. ADAMSON

## Dermatology

**Experimental and Clinical Observations with Histaminase.** Knoll, A. F. and Beinhauer, L. G.: *Arch. Dermatol. & Syph.*, 1940, 42: 896.

The authors review the history of the discovery by Best and McHenry of a substance in certain organs of the dog, capable of inactivating histamine, and their work and that of later investigators of this substance, called histaminase. They carried out a large number of experiments and clinical trials in animals and man, the series of animals being greater than any previously reported on. Their results appeared to support the view that there is no justification for assuming that histamine is the only harmful cell-constituent liberated by injury, and that consequently one need not expect so specific a substance as histaminase to alter strikingly the anaphylactic reaction. One hundred and thirty-four patients were treated orally with histaminase. Of these 101 suffered from allergic diseases, and 33 from miscellaneous disturbances. Pronounced improvement obtained in only 26.1 per cent of the cases. The unimproved group was treated for six weeks. More than half of the improved group were afflicted with atopic dermatitis or acute urticaria, two diseases which often improve spontaneously.

D. E. H. CLEVELAND

**Staphylococcic Impetigo Contagiosa.** Epstein, S., *Arch. of Dermat. & Syph.*, 1940, 42: 840.

Epstein shows that while the rôle of the streptococcus in the etiology of impetigo contagiosa has been settled, and the existence of staphylococcic form is still contested by some authors, the latter represents a specific entity with a characteristic clinical picture. The staphylococcic etiology of this type has been established definitely by: (1) the correlation of clinical and bacteriological diagnosis; (2) proof of the etiological rôle of the staphylococcus by special bacteriological methods; (3) the production of typical staphylococcic impetigo by inoculation of *Staph. aureus*. D. E. H. CLEVELAND

### Pathology and Experimental Medicine

**Cytology of the Gastric Contents, with Special Reference to Gastritis.** Mulrooney, R. E. and Eusterman, G. B.: *Arch. Surg.*, 1941, 42: 55.

Since epithelial desquamation, as well as exudation, is characteristic of mucosal inflammation, it seems reasonable to conclude that cytological examination of the gastric juice under favourable conditions would be of diagnostic value in cases of gastritis. The procedure also promises to be an important adjunct to roentgenoscopic and gastroscopical examinations and to be helpful in determining the effect of treatment of gastritis. The authors assess the results of tests of 50 patients. They offer a technique for study of the cellular elements of the gastric contents after an alcohol test meal which is described in detail. Neutralizing the gastric acids *in vivo* was a definite aid in preserving the integrity of the cytoplasm of the cells of the gastric contents, but the nuclei could normally be differentiated from one another, even though their cytoplasm had been digested away. Results of the test are given of patients with uncomplicated duodenal ulcer, duodenal ulcer with stenosis and secondary gastritis, benign gastric ulcer, gastric carcinoma, persistent gastric symptoms after gastric operations, gastrojejunal ulcer, gastritis. The authors believe that their method of study offers great possibilities for the diagnosis of gastritis and permits a numerical evaluation of the response of the gastric mucosa to therapeutic measures.

G. E. LEARMONTH

**Human Sternal Bone Marrow in Hyperthyroid and Myxædematous States.** Jones, R. M.: *Am. J. M. Sc.*, 1940, 200: 211.

The author found that 12 persons with hyperthyroidism showed an average of 13.5 per cent nucleated cells in the sternal bone marrow, whereas 7 cases of hypothyroidism showed only 2.4 per cent nucleated cells. These findings were compared with 18 control cases in which the average count was 6.2 per cent nucleated cells. In other words, the hyperthyroid cases

showed a hyperplastic sternal marrow, and the myxædematous patients, subnormal marrow activity. Following desiccated thyroid or thyroxin administration the hypothyroid group developed a more normal marrow. After thyroidectomy the marrow of the hyperthyroid cases became less hyperplastic. In all instances the marrow changes were myeloid in character and were not reflected in the peripheral blood.

E. S. MILLS

### Hygiene and Public Health

**Blood Pressure Study, 1939.** Compiled and Published by the Actuarial Society of America and the Association of Life Insurance Medical Directors, New York, N.Y., 1940.

The prognostic significance of blood pressure is not universally agreed upon by medical men. Many competent physicians minimize the import of moderate elevations of blood pressure; others magnify it. Insurance carriers have to take things as they find them and without necessarily searching out causes; if significant correlations occur, rates are adjusted to fall in line with them.

A number of studies of blood pressure have been made by insurance actuaries. The latest is the one under review. Essentially the study confirms previous findings that mortality increases as blood pressure increases. Numerous tables are given showing the ratio of actual to expected deaths at different age-groups and at different blood pressures. For the first time the systolic and diastolic blood pressures are considered together. Taking all diseases and all ages together the records show a progressive increase in mortality as systolic blood pressure increases. Those who had systolic blood pressures of under 130 mm. at the time of issuance of the policy had a ratio of actual to expected deaths of approximately 1, while those with blood pressures of 158 mm. and over had a ratio of 2.4. Similar figures are given for diastolic pressures. For entry ages of 40 years and over the systolic pressure appears to be the more important factor and for entry ages below 30 years the influence of the diastolic seems more marked than that of the systolic pressure.

If the analytical procedure is applied to specific diseases it is found, as might be expected, that in the case of the cardio-vascular-renal diseases high mortality was associated with high systolic and diastolic pressures, so too with deaths from cirrhosis of the liver. Deaths from tuberculosis, however, were significantly associated with low blood pressures.

There are 19 tables in the main body of the report and 4 tables in the appendix. A selected bibliography is given. The book is of obvious value to insurance people and should be of considerable interest to the medical profession, particularly to cardiologists and internists.

FRANK G. PEDLEY

## Obituaries

David Low, M.D., C.M., F.R.C.S.(C), of Regina, Sask., died on the morning of March 9, 1941, and when the news was passed around there were none who did not experience a sense of loss, although his death was not unexpected. He had been ailing for some time past, and his passing was a release from his distress.

On July 1, 1890, after spending a short time at Prince Albert, Doctor Low came to Regina where he practised medicine and surgery until his death. And as one looked at the oak casket, one felt how, appropriately, it contained a heart of oak that had served the community through the rigorous times of pioneer life from the days of Regina, the village, to Regina, the city, of 60,000; from the days of mud roads and the horse and buggy to the days of pavement and motor cars.

Few of us today know anything of the medical men of this city who preceded Doctor Low, and so look upon him as Regina's first doctor. Time gathered more and more members of the profession around him, with him as their leader and steady guide. In ethical procedure he expressed himself forcefully on many occasions, but always impersonally; his profession was first, he himself last.

The profession of Saskatchewan owes much to him for guidance in the early days during the transition from the North-West Territories to the Province of Saskatchewan and the organization of the Saskatchewan Medical Association of which body he was the president in 1912 and 1913. The profession of Canada will remember him as the president of the Canadian Medical Association in 1926. The Fellows of the Royal College of Physicians and Surgeons of Canada will remember him as the forceful figure of 1927, fighting for the establishment of a Royal College which would be a mark of proficiency for the profession of Canada, distinctively Canadian, and on a par with that of any other country. As the result of this effort the Royal College of Physicians and Surgeons of Canada was brought into being.

His whole life was one of service to the people and profession. No call was too trivial and no obstacle too great to tackle, were it storm, mud, flood, or distance, often at great risk to himself. On occasion it would seem that an unseen hand guided and protected him, otherwise he might have been killed by a train or lost on the prairie.

Doctor Low graduated from McGill University in 1888, and spent two years in internship in Montreal before coming west. He thus was our link with the days of Lord Lister, and he experienced the changing methods of that time. He operated under the carbolic spray and followed all the steps from antiseptic to aseptic surgery. He followed the development of x-ray from the static machine with the revolving disc to the advanced methods of the present. He was a keen student of the microscope and its aid to diagnoses, from its meagre use at the time of his graduation to the advancement of the present day. A keen student throughout.

He came to Regina when there was no hospital and watched the gradual development of our two large institutions, the Regina General and the Grey Nuns. The first accomplishment to that end was only a few rooms in a private home on McIntyre and 11th Avenue in 1889. Later, with the help of some ladies, a better building on 13th Avenue and Hamilton Street was obtained in 1897 which had the first semblance of a hospital. Then through his efforts the Victorian Order of Nurses was induced to open and staff a larger institution on Hamilton and 14th Avenue in 1900, which was taken over by the city in 1907, and thus became the nucleus of the present General Hospital. Dr. Low was a member of the Saskatchewan Cancer Commission from its inception in 1931 until his death.

Doctor Low's opinions were founded on experience and extensive reading. Many of the older men will remember the vigorous arguments he urged in connection with the use of diphtheria antitoxin. He always had the courage of his convictions, and of later years seldom lost the opportunity of jokingly exclaiming, "Why! we did that forty years ago". He was a careful diagnostician, an excellent consultant, and a surgeon of recognized ability. We shall miss his wise counsel and professional bearing in our deliberations of the future.

S. E. MOORE



Photo by Blank & Stoller Ltd., Montreal

DR. DAVID LOW

### AN APPRECIATION

With the passing of Dr. Low there has gone from the medical profession of Saskatchewan one of its stalwart, sterling members.

Back in the early days of civilization in Saskatchewan, Dr. Low came to Regina, where his great

efforts to relieve pain, cure disease, or mitigate its cause, were always at the call of all, regardless of monetary consideration, exemplifying principles upon which the profession of medicine was built and which have made it what it is. He fought alike the elements of snow, frost, blizzard, mud and slough to carry the benefits of medical science to the unfortunate that they might live. His success in this needs no words of mine. Memory of those deeds of his will live on after him. Not only did he battle against the above most successfully but he battled against the human element outside the profession who sought to sabotage his special calling which he so highly respected and so well represented.

A man of sturdy will and brilliant mind, who, like a mariner on an uncharted sea, laid out his course, made sure he was right, and pursued that course to the end. Such an one is beyond value and to one who knew his great disappointment at the turn of medical affairs when he, physically, was unable to carry the battle to the enemy of his profession, it brought a sting of pain.

Dr. Low was one of Canada's great citizens, as a man, a doctor, a friend, and a patriot and one who fought so hard and honestly for those principles which he knew to be right.

A patriot to his country; a patriot to his profession; a patriot to his conscience.

AN ADMIRER

Dr. John Vassie Brown, of Orillia, Ont., died on April 8, 1941, aged 64. He was born in Barrie, graduated from the University of Toronto (1903) and practised medicine in Orillia for more than 25 years. He served with the Royal Canadian Medical Corps with the rank of captain in the first Great War, having enlisted in 1914 and being discharged in 1918.

Hon. Ernest Choquette, M.D., M.L.C., of Montreal and St. Hilaire, Que., died on March 29, 1941. He was born in Belœil, Vercheres County, on November 18, 1862, a son of Joseph Choquette and Marie Audet. He attended St. Hyacinthe College, and later went to Laval University Medical School, Montreal, to study medicine. Graduating in 1886 he set up a practice in St. Hilaire. He divided his attention between medicine and literature, and produced some well-known French-Canadian works, including "Claude Payson," "Les Ribaud," "La Terre" and "Carabinades," works of which outstanding critics wrote appreciatively.

His third interest was politics, which finally superseded medicine in the first place among his public activities. At a comparatively early age he abandoned medical practice to devote himself to politics and literature, and in both of these fields he became an outstanding figure.

His long and successful services to the province as a Liberal campaigner at many elections and also as a frank and fearless counsellor and critic from within the Liberal party earned him his nomination in 1910 to the Upper House in Quebec, where he succeeded the late Hon. F. Gosselin as member for Rougemont.

Dr. Choquette was a member of the Royal Society of Canada as well as a Governor of Quebec's College of Physicians and Surgeons. He belonged to the Reform Club, the Club Canadien, and the Canadian Authors' Association. For many years he was mayor of the parish of St. Hilaire.

The death of Dr. T. H. Eastwood was recorded last month in the *Journal*. The following "Appreciation" by Dr. G. Stewart Cameron, of Peterborough, was sent us too late for earlier publication.

#### AN APPRECIATION

John Havelock Eastwood died in Peterborough on February 17, 1941. Born at Pickering, Ontario County, in 1866, he was one of the older physicians of this city. Notwithstanding this seniority, he continued in the active practice of his profession until a short time before his death. His father before him was a doctor—one of that splendid body of country practitioners who assisted in laying the foundations of medical practice in this Province. The son was proud of this heritage, and sought at all times to maintain those traditions of the healing art with which he had been surrounded in early life.

After the usual pre-medical education of the day, Doctor Eastwood entered the Faculty of Medicine of the University of Toronto, from which he graduated in 1887. After some six years of practice in Pickering he moved to Peterborough, where he early secured and maintained the confidence of a large circle of patients and friends. He engaged in general practice until 1920, when he joined with other medical associates in forming the Standard Medical and Surgical Clinic. From this time on he devoted most of his energies to paediatrics, in which department he established more than a local reputation.

Of a retiring disposition, Dr. Eastwood did not seek the more exhilarating field of medical politics. This reticence, however, did not indicate any lack of interest in the general welfare of his profession. On the contrary, he believed the practice of medicine to be a great influence for the betterment of human lives, in as much as good citizenship is more likely to be built on a foundation of sound minds in sound bodies, nurtured in healthful surroundings.

He was keenly interested in the intelligent development of his country and his own community, and always supported those who, in his estimation, were most likely

to give selfless leadership, regardless of their political or religious affiliations. In his earlier years he was fond of cricket and curling, but later golf claimed him as a faithful disciple.

His wife, who survives him, was Miss Paxton, of Whitby. Two sons, William of Peterborough and Hubert of Hamilton, and one daughter, Mrs. Alex. Donnelly of Peterborough, are left to mourn the loss of a devoted father.

The funeral service in Saint Andrew's Church was very largely attended and was a striking evidence of the esteem in which he was held. Into many a troubled home he came and seldom did he depart without leaving behind some encouragement, some word or act that sought to ease the burden resting upon those to whom he had come to minister either as physician or as friend.

Dr. Howard Roxboro Elliot, of Grimsby, Ont., died on April, 1941, in his eighty-third year. Dr. Elliot was born in Iroquois, Ont., and practised for 58 years. He graduated in medicine from Victoria College, University of Toronto, in 1881 and in the following year took his L.R.C.P., L.R.C.S. in Edinburgh. Returning to Canada, he started his career at Brucefield, Huron County. After eighteen years in Huron County, Dr. Elliot moved to Denver, Col., where he practised for forty years. Five months ago he came to Grimsby to retire.

Dr. Alexander Jardine Hunter, of Teulon, Man., died on August 25, 1940. He was born in 1868 and a graduate of the University of Toronto (1895).

Dr. John Lachlan MacIsaac, of Antigonish, N.S., died on March 24, 1941.

Dr. MacIsaac was born at Dunmore, Antigonish county, on June 3, 1870, and was the son of the late Lachlan and Mary (MacIsaac) MacIsaac. After attending the schools at Dunmore and St. Joseph's he studied at St. Francis Xavier, breaking his course to teach school. In 1898 he went to British Columbia where he worked until 1903 as a lineman. He graduated from the Baltimore Medical College in 1907, came back to his native county and started his practice in Antigonish. He had been there ever since, and nearly every year had taken post-graduate courses at hospitals in Montreal, New York, Baltimore, Chicago and at the Mayo Clinic at Rochester, Minn.

In 1920 he was elected a Fellow of the American College of Physicians. In 1925 he was elected to represent Antigonish county in the Provincial Legislature and had been re-elected at every election since. He was a valuable member, and his studied opinion has been of great value to his province. About ten years ago he was a member of a commission appointed by the Provincial government to look into the flour mill situation. From 1925 to 1928 Dr. MacIsaac was one of an opposition of three, the others being the late Hon. William Chisholm, of Antigonish, and D. B. MacLeod, Victoria county. He always took a great interest in St. Martha's Hospital, from its humble beginning to the large institution it is now. His fame as a surgeon went far beyond the province.

Dr. William Robertson, of Elora, Ont., died on March 30, 1941, at the age of seventy-six. A native of Chesterfield in Oxford County, he was a son of the late Rev. William Robertson, and a grandson of the late Rev. William Duff, former minister of Knox Presbyterian Church in Elora. He was a graduate of McGill University (1890) and had been Medical Officer of Health for Pilkington Township for many years. He had practised in Elora for fifty-one years.

Dr. Hugh McLean Scott, of Morriston, Ont., died in February, 1941, in his thirty-sixth year. Born at Bdenoch, in Pushtich Township, a son of Mr. and Mrs. Andrew Scott, Dr. Scott received his secondary education at the Guelph Collegiate and Inter graduated in medicine from Queen's University (1929). After serving a year as intern at Victoria Hospital, London, Dr. Scott opened

a practice at Lucan, which he conducted for four years before coming to Morriston.

Dr. William Woodhouse Scott, Hazelridge, Man., died on March 19, 1941, in his seventy-ninth year. A son of the late Rev. John Scott, pioneer missionary of Emerson, Dr. Scott was born in Napanee, Ont., and came to Emerson with his parents in 1876. He graduated from Manitoba Medical College in 1895 and from then until 1916 practised medicine in Walhalla, and for the last 20 years in the municipality of Springfield, Man.

Dr. Manley Adair Shipley, of Kirkland Lake, Ont., died on April 8, 1941, aged forty-four years. He was a graduate of the University of Toronto (1925).

Dr. Arthur Alexander Johnston Simpson, of Kintail, Ont., died on March 21, 1941, in his seventy-eighth year. The late Dr. Simpson was born near Walkerton, son of the late Arthur Simpson and Margaret Johnston Simpson, early pioneers of that district, both of whom came from Aberdeen, Scotland. He received his elementary school education in the rural school, afterwards going to High School in Walkerton and Owen Sound, where he also attended Model School. After teaching in Culross for two years, he attended Normal School in Ottawa, and, following in the footsteps of his father, who was a school teacher, he taught for seven years at Britannia Bay, near Ottawa. He was a graduate of Trinity University, Toronto (1904). After interning at Singhampton with Dr. Ball, he was assistant for a short time to Dr. Elliott of Lucknow, and then went to Kintail, where he established a flourishing rural practice which he continued for thirty-seven years, until his death.

Dr. Roland Earl Taylor, of Windsor, Ont., died on March 14, 1941. Dr. Taylor was forty-four years of age, was born in Woodstock and educated in Woodstock public and high school. He graduated from the University of Toronto in 1922. For a short time he practised in Burgessville and came to Windsor in 1924.

While still a student Dr. Taylor enlisted during the First World War and served in France for two years as a signaller with the Canadian Expeditionary Force.

He was an honorary member of the Canadian Legion branch at "The Hut"—Ward Two.

Dr. Taylor belonged to the staff of Windsor's three major hospitals, Grace, Metropolitan General, and Hotel-Dieu.

His deep concern was the well-being of humanity and his unselfish devotion to the profession which he honoured, was a tradition among those associated with him. His inspiring service and untiring devotion to those whom he served will ever remain with us. J. A. LEO WALKER

Arrangements have been made for five district meetings to be held the first week in June, commencing at Red Deer on June 2nd and continuing for five days. They will cover Calgary, Lethbridge, Medicine Hat and Drumheller as well as Red Deer. The following will make the tour: Dr. J. Ross Vant, Edmonton, President-elect, Canadian Medical Association, Alberta Division; Dr. R. B. Francis, Calgary, President, College of Physicians and Surgeons; Dr. J. K. Fife, Edmonton, Surgeon; Dr. James Calder, Edmonton, Paediatrician; Dr. George R. Johnson, Calgary, Registrar, College of Physicians and Surgeons.

In addition to addressing the meetings as President-elect, Dr. J. Ross Vant will give a scientific paper on obstetrics at each meeting. As these are annual meetings the elections for officers for the coming year will take place.

The Department of Health has developed a system of district nursing to the point where they now have 33 well trained and efficient women rendering nursing service in the outlying and sparsely settled districts. While people who are able to pay are supposed to contribute a nominal fee, in actual practice, the service is rendered gratis for the most part.

The Committee of the Division dealing with co-operation with the Department of Militia in recommending suitable medical men for various posts, has been quite active and is meeting with the D.M.O. early in April to further assist the department.

Recently there was laid on the table of the Legislature, the annual report, which for the first time analyzed the expenses of the medical-aid fund. For some time the workmen, in reading the report, have considered money from this fund was going to the medical men in its entirety, which has created a false impression, and some unions have felt that the doctors' fees must have been too large. It was openly stated by people without knowledge that the physicians received more money from the Board than the workmen did from the Accident Fund, which was quite wrong, as the following figures show:

Payments from Pension Fund to permanently disabled workmen, and dependents of those fatally injured ...	\$443,487.34
Payments of compensation and other allowances to workmen .....	402,322.01
Other benefits and services to injured workmen .....	15,497.40
	<hr/>
	\$861,306.84
Payments to attending physicians and specialists .....	\$127,521.85
Hospitalization and other services .....	194,586.35

By the above it will be seen that while the workmen received \$861,000 of which \$402,000 was for compensation, the physicians caring for them received only \$127,500. It is felt that all future reports should thus divide the Medical Aid Fund to show the actual payments to members of the profession. The Board reports that the average accident case is costing less and less as time goes on, and that from physical therapy they are getting marked beneficial results.

The Department of Health has opened its diagnostic and treatment clinic in Calgary, with the following as members of the staff: Drs. J. W. Richardson, surgeon; R. R. Hughes, physician; W. S. Quint, radiologist; R. C. Riley, pathologist.

It is understood that the cases are to be diagnosed at the Holy Cross Hospital and patients likely to be cured or benefited by deep x-rays or radium therapy will be referred to Dr. W. H. McGuffin at the Radium and X-ray Institute. G. E. LEARMONTII

## News Items

### Alberta

The annual refresher course arranged by the Canadian Medical Association, Alberta Division, and the University of Alberta, arranged for the week commencing May 12th, was held in the University Hospital, Edmonton. In order that the course should cover the points desired by the prospective registrants, a plebiscite was taken of the profession in Alberta, which was well responded to. In addition to the medical staff of the University, the following clinicians were present: Dr. J. D. Adamson, Winnipeg; Dr. Charles B. Puestow, Chicago; Dr. E. P. Scarlett, Calgary. Dr. Adamson is professor of medicine in the Manitoba University and Dr. Puestow is second in command of the educational research hospital in Chicago.

## British Columbia

The following men were elected to the Council of the College of Physicians and Surgeons of British Columbia: District No. 1, Drs. F. M. Bryant and Thomas McPherson; District No. 2, Dr. W. A. Clarke; District No. 3, Drs. H. H. Milburn and Wallace Wilson; District No. 4, Dr. Osborne Morris; District No. 5, Dr. F. M. Auld. Of these the following are newcomers, Drs. Auld, Bryant, Milburn and Wilson.

The vital statistics for British Columbia, and especially Vancouver, are gradually attaining a very high standard of excellence. Dr. Stewart Murray, M.H.O. for Vancouver, states that the infant mortality for Vancouver during 1940 was the lowest of any large city in the world, while maternal mortality has also reached a record low figure for North America. There was not a single case of diphtheria during 1940. These facts reflect considerable credit on the work of the Public Health Department of British Columbia and upon hospital conditions in this province.

The British Columbia Cancer Institute reports some interesting and important facts. Fifty per cent of those attending come from points outside Vancouver where the Institute is situated. The greatest need of the Institute is hospital facilities for those requiring hospitalization, although the Vancouver General Hospital, which is always over-taxed as regards bed capacity, has co-operated most loyally and given every aid possible. The public sympathy and support for the work of the Institute is growing, and a movement is on foot to attack this problem aggressively and increase facilities for the work of the Institute.

Dr. G. F. Amyot, Provincial Health Officer, speaking at a recent meeting, made a strong appeal for better reporting of cases of cancer. As things are at present this is practically non-existent, except on the death certificate of those dying of cancer.

A very well-attended meeting was held on April 1st in the Auditorium of the Medical Dental Building in Vancouver when the Committee on the Study of Cancer of the British Columbia Medical Association put on a program dealing with all aspects of cancer—diagnosis, symptomatology and therapeutics. Men from all parts of the province attended, and papers were contributed from Victoria. J. H. MACDERMOT

## Manitoba

At the request of the Manitoba Medical Association the Department of Health and Public Welfare instituted an inquiry into the causation of prenatal, natal and neonatal deaths occurring in Manitoba.

Figures for the first six months from May to October, 1940, inclusive, have been released. For this period there were recorded 6,277 live births, 161 stillbirths, and 153 deaths of children under 14 days of age. This gives a death rate for children between 28 weeks' gestation and 14 days of extrauterine life of 48.6 per 1,000 births. Of every 100 children who have reached 28 weeks of life within the womb almost 5 die within the next three months. The mortality rate of Indian children is nearly four times that of white children: Indians, 183, whites, 46 deaths per 1,000 live births.

Two hundred and seventy questionnaires have been sent out to doctors certifying stillbirths and deaths of children under 14 days of age for the period under review, and of these returns have been made of 214, or 79 per cent. As no payment is made for filling out these questionnaires a return of nearly four out of every five must be considered a high figure.

Of the 214 deaths 54 have been due to complications of labour; 32 to diseases of the mother; 37 to anomalies of the placenta, cord and membranes; 33 to abnormal development of the fetus; and only 14 to diseases which might be termed post natal. In this series of

214 deaths the forceps deliveries numbered 22 per cent and Cæsarean sections, 1.5 per cent.

A study of the returns in connection with the 214 deaths indicates that risk to offspring increased with a rise in the age of the mother and in the later pregnancies.

A survey of health activities in Manitoba will be made by the American Public Health Association, beginning about May 1st. Hon. J. O. McLennaghan, K.C., Minister of Health and Public Welfare has announced that his department will co-operate in the survey. City and suburban health departments and the Winnipeg School Board have also agreed to help.

The survey will be made by staff experts and at the expense of the American organization. Its object will be to determine if the best possible health facilities are being provided, and if the activities of the provincial health department are of greatest possible service in the war effort.

A 25-bed medical building will be erected shortly at Stevenson Field, Winnipeg, to provide extended facilities for Royal Canadian Air Force units. The building, which will probably be placed on the premises of No. 8 Repair Depot, will be the standard air-force type, similar to the medical building at the Tuxedo wireless school. It will contain facilities for providing short periods of treatment for air-force personnel. Airmen who require extended hospitalization are sent to Deer Lodge or other hospitals, approved by the Department of Pensions and National Health.

The Senate of the University of Manitoba adopted the recommendation from the Medical Faculty Council Executive, and approval has been given to a plan for the conduct of the final year examinations in medicine co-incidentally with the examinations of the Medical Council of Canada. This action has been received with great satisfaction both by medical students and members of the Medical Faculty.

A renewal contract has been signed by representatives of the medical profession in Winnipeg and the Firefighters' Club to provide a complete medical service for the year commencing April 15, 1941. The dues collected from the members of the club will be on a considerably higher scale, as the first year's experiment showed that much more service was required than had been anticipated. About one person in twenty received major surgical treatment.

The Firefighters' Club has expressed its satisfaction with the medical services rendered by the profession during the past year. ROSS MITCHELL

## New Brunswick

Dr. E. A. Petrie, Radiologist at St. Joseph's Hospital, Saint John, has been elected a member of the American College of Radiology.

Dr. N. Skinner was the speaker at the monthly meeting of the Saint John Medical Society held in the Admiral Beatty Hotel on March 25, 1941. Dr. Skinner reviewed a number of case histories from his own practice in which allergy was the deciding factor in diagnosis. Dr. Skinner has been especially interested in this particular branch of medicine for some time and his presentation was much appreciated by the large number in attendance.

Dr. S. R. D. Hewitt, Superintendent of the Saint John General Hospital, has been a patient in his own institution for some weeks. He has now returned home for convalescence.

Dr. Hugh Farris, of Saint John, has returned home from a holiday spent at Nassau.



In spite of difficulties with foreign exchange, a number of local physicians are contemplating post-graduate courses in the United States. Dr. N. Skinner is leaving next week for a refresher course in gastro-enterology, in Boston.

Dr. R. A. H. Mackeen, Provincial Pathologist, has been appointed Hospital Pathologist at Camp Sussex. Dr. Mackeen was a lieutenant in the R.C.A.M.C. (R.F.) and has now been transferred to the active force.

For some time the local press of New Brunswick has contained references to the employment of an unregistered physician in the Provincial Hospital for the Insane at Saint John. The impression has been fostered by certain individuals that the physicians in New Brunswick, through their Council of Physicians and Surgeons, have been persecuting this physician who happens to be a European driven from his home due to wartime conditions. The Registrar of the Council, Dr. J. M. Barry, made it very clear last week in a letter printed in the local newspapers that the physicians in New Brunswick were only interested in that fact that this man was employed by the Provincial Government in a position of responsibility without proper registration. The refugee physician in question had twice tried the Dominion Medical Council examinations in Montreal and had twice failed. The physicians in New Brunswick were only asking that this refugee physician follow the same rules and satisfy the same qualifications as the young physician, born, bred and educated in Canada is forced to satisfy.

A. S. KIRKLAND

### Nova Scotia

"Viewed as a whole, the state of the public health (in Nova Scotia) is encouraging, and the favourable trend in those diseases which are amenable to the intervention of physicians and health officers continues." Thus was summed up the health of the province, as tabled in the legislature by the Department of Public Health. Examination of mortality tables for 1940 showed a decrease in communicable diseases with the exception of whooping-cough and tuberculosis. While tuberculosis deaths jumped by 12 to 428, the figure was not out of keeping with the record low of the past two years. In typhoid, measles, scarlet fever, diphtheria and syphilis, the mortality rate showed a new minimum.

"The advent of war has thrown extra burdens upon all important personnel of the department," the report states, adding that close co-operation with the national defence authorities has been maintained.

Fatalities were: heart disease, 997; cancer, 730; tuberculosis, 428; whooping-cough, 60; venereal diseases, 33; diphtheria, 15; scarlet fever, 3; measles, 3; infantile paralysis, 3; typhoid, 2; infant mortality, 64; maternal mortality, 49.

Dr. C. H. Best addressed a public meeting at Halifax to arouse interest in the development of a blood donor scheme to provide reserves of dried serum. A resolution pledging support to the project was passed unanimously.

Testing of more than 100,000 heads of cattle for tuberculosis, in six counties, revealed 0.4 per cent reacting.

The usually circumspect *New York Times* outraged Halifax with a too vivid account of its infectious disease problem, describing the crowded port, in the words of its informer, as a "hell-hole of infection". The informer was one of the group of Harvard bacteriologists and technicians who had come to Halifax to study contagion with a view to solving United States army problems. The Boston reporter, besides interviewing the informer, had studied the official report of Dr. J. H. Mueller, head of the group. He told of the bacteriologists, an heroic band, braving death as their plane dipped into the Halifax germ-laden air, bringing succour—keeping the port open to send its convoys to Britain, to win the war.

Their epic he pictured as a new, stirring chapter in modern medical history.

Halifax officials and citizens who had greeted the visitors warmly, and with happy memories of the Massachusetts aid after the Halifax explosion of 1917, felt bad. So did Dr. Mueller. He flew back immediately to make apologies and public reparations. The new history chapter closed on a restrained note.

Colchester County Hospital at Truro, after discussing, at its meeting, the busiest period it has known, decided that further space was essential, and began arrangements to take over a part of the Maritime Home for Girls as a maternity hospital.

The Halifax Municipal Council has recommended to the Department of Health that it consider giving a bonus to doctors willing to undertake rural practice in communities now without medical aid. This would take the form of a guaranteed minimum income.

ARTHUR L. MURPHY

### Ontario

The Hamilton Academy of Medicine and McMaster University have combined, for the seventh consecutive year, to bring to the science students of the University and to the physicians of District Number Four, Ontario Medical Association, a series of scientific lectures dealing with the newer advances and the treatment of disease. This year's lectures have covered the field of radiation therapy. The first lecture dealt with fundamentals of x-ray, radium, ultra-violet, short wave and like radiation; a second dealt with the practical application of the various methods of radiation therapy.

It has been pointed out that the mortality rate of cancer in Ontario doubled during the period 1919-1938. In 1938, 12 per cent of all deaths in the province were due to cancer, a rate of 120 per 100,000. The rate for Hamilton was 106 and for Toronto, 130.

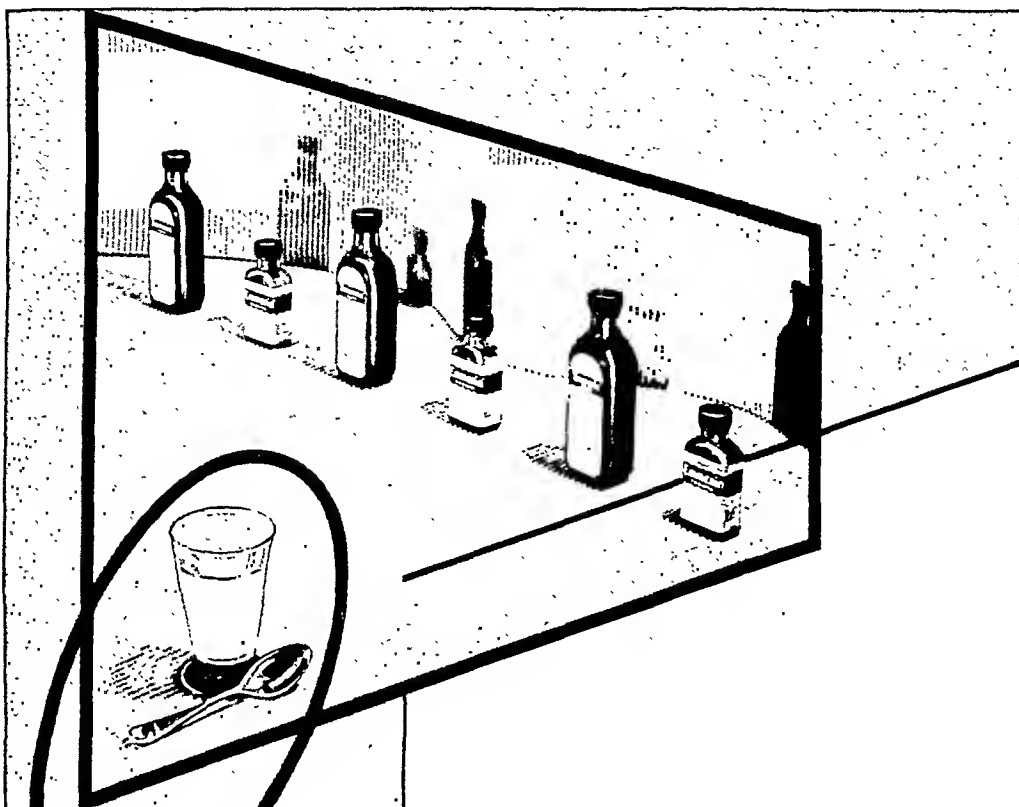
The Education Committee of the Ontario Medical Association for District Number 1 announces a course of post-graduate studies in Military Medicine, Fracture Therapy, Traumatic Surgery, and Cancer Diagnosis, at the University of Western Ontario, London, each Wednesday from April 23rd to May 21st, inclusive. A second part of the annual post-graduate course will follow in September and October.

Dr. M. H. V. Cameron, of Toronto, has been re-elected President of the College of Physicians and Surgeons of Ontario.

Dr. William McClure, who was a student in medicine under Osler at McGill University, and has had a brilliant career in Honan since 1888, has reached his eighty-fifth birthday. On this day he was at home to a number of his friends. A letter of over fifty years ago, written by the Secretary of the Foreign Missions Board, recorded how Osler had considered Dr. McClure one of his best students, and feared that he would be wasting his life in China.

Dr. P. H. Huyck, of Kingston, delivered his maiden address as President of the Ontario Motor League on March 11th, driving from Toronto to the Falls through the blizzard that raged that morning. Active in the past as President of the Kingston and Frontenac Medical Society, he should be a source of great strength to the Motor League.

The Section on Historical Medicine of the Academy of Medicine, London, marked Lister Day by a special program at the Victoria Hospital. Dr. G. A. Ramsay dealt with the historical development of wound healing, followed by Dr. S. A. MacDonald, A. J. Grace,



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and R. A. Johnston, dealing with wound healing and drainage. The luncheon address was given by Dr. G. W. Stavratsky, "Lister as a physiologist".

Lister Day at the University of Toronto was marked by the annual address founded by Dr. Donald C. Balfour, of the Mayo Foundation. The guest speaker on this occasion was David Cheever, A.B., M.D. (Harvard), F.A.C.S., Associate Professor of Surgery Emeritus, Medical School of Harvard University, who spoke on the subject, "War: its toll and its tributes".

Plans are under way for the official opening of the three newly completed hospitalization and active treatment units at Westminster Hospital, London. The cost of construction program and equipment has been approximately \$400,000.

The Ontario Hospital Association is offering to the public a Plan for Hospital Care. The Board of Administration is to serve without pay. The benefits afforded subscribers are, twenty-one days of hospital care each year, with standard or semi-private accommodation, including meals, dietary, and general nursing service, and the use of the operating room as often as necessary, together with anaesthesia, ordinary drugs and medication, dressings and laboratory service. For maternity care, one-half hospital charges up to twelve days. There is no age limit. The monthly rates are 50c. and 75c. for the individual subscriber; \$1.00 to \$1.50 for the family. The higher rate provides semi-private accommodation. J. H. ELLIOTT

### Quebec

L'Organisation panaméricaine de la lutte contre le cancer tiendra un congrès en 1942 à Buenos-Ayres, Argentine. Le Dr. Ernest Gendreau, membre du Conseil d'administration de cette organisation, vient de se voir confier la direction de cette lutte au Canada.

On annonce les quatre nominations suivantes à l'hôpital Ste-Justine: le Dr Gaston Lapierre qui devient F.R.C.P. (Canada); le Dr Edmond Dubé, F.R.C.S. (Canada); le Dr N. R. Bouziane, Fellow du Canadian Institute of Chemistry, et le Dr Maurice Bonnier, Fellow de l'American College of Chest Physicians.

Le rapport du Service de Santé pour 1939 nous apprend que 13 enfants d'âge scolaire sont morts de diphtérie. Ces enfants n'avaient pas été immunisés. Ces morts inutiles sont imputables à la négligence. La campagne de prophylaxie doit continuer pour éteindre définitivement cette maladie évitable.

Pour la quatrième fois depuis 1928 le bill des chiropraticiens a été battu le 14 février dernier au comité des bills publics de l'Assemblée Législative par 10 voix contre 7.

Deux hôpitaux annoncent des cours de perfectionnement en pédiatrie: l'hôpital Ste-Justine et l'hôpital de la Miséricorde. Au premier hôpital les séances auront lieu du 2 au 7 juin et seront dirigées par le Dr Gaston Lapierre. Au second hôpital elles auront lieu du 7 au 12 juillet et la direction en a été confiée au Dr Paul Letondal.

Le Dr D. Léonard vient d'être chef du service d'électro-radiologie de l'hôpital Notre-Dame. Le Dr Georges Hébert, du même hôpital, a été nommé secrétaire français de la Canadian Medical Association, division de Québec.

La Société Médicale de Montréal a consacré sa séance du 18 mars dernier aux hémorragies méningées médicales, obstétricales et chirurgicales. Les rap-

porteurs ont été, dans le même ordre, les Drs. Antonio Barbeau, Donatien Marion et Albert Guilbeault, Jean Panet-Raymond.

**Pre-employment Medical Examinations for Domestic Workers in Montreal.**—At a recent meeting of the Section of Pædiatrics of the Montreal Medico-Chirurgical Society, the question was discussed of the risks of contact infection, especially to children, in the home, and the advisability of medical examinations for domestic employees. A committee was accordingly appointed under the chairmanship of Dr. Aubrey Geddes to explore ways and means of providing a centre for the examination and health certification of household workers, and to conduct a campaign of educational publicity.

The American Academy of Pædiatrics has been interested in this question of contact infection for some time, and systems of examination have been introduced in several cities. Arrangements are going forward satisfactorily, and it is hoped that adequate facilities will soon be available in Montreal. JEAN SAUCIER

### Saskatchewan

With infant mortality rate the lowest yet recorded, the birth rate the highest in five years, and low general and maternal mortality rates, Regina had an excellent health record in 1940, according to Dr. G. R. Walton, city medical health officer.

During the year 39 infants under one year died, a mortality rate of 39.4 per 1,000, compared with 45.6 the previous year and 59.4 in 1937. Only one mother died in childbirth compared with 6 in 1937. Deaths from all causes totalled 345, yielding a rate of 6.4 per 1,000 compared with 6.1 in 1939 and 6.5 in 1937.

With a death roll of 140, diseases of the heart, arteries and kidneys took highest toll of Regina residents in 1940, nearly one-third of the total. Cancer, with 45 deaths, compared with 56 the previous year, maintains its reputation as a killer. Pneumonia caused 29 deaths and there were 21 accidental and violent deaths in the city. Tuberculosis accounted for three deaths, the lowest in several years.

From a public health viewpoint the most serious event of the year was the occurrence of 11 cases of diphtheria, of which 4 were fatal. In the previous five years only 11 cases and 2 deaths occurred, though Regina's expected incidence from this disease is 153 cases annually. As a result of an educational campaign 2,080 children, of whom 744 were under school age, were inoculated against diphtheria by the department last year and many more were similarly treated by private physicians.

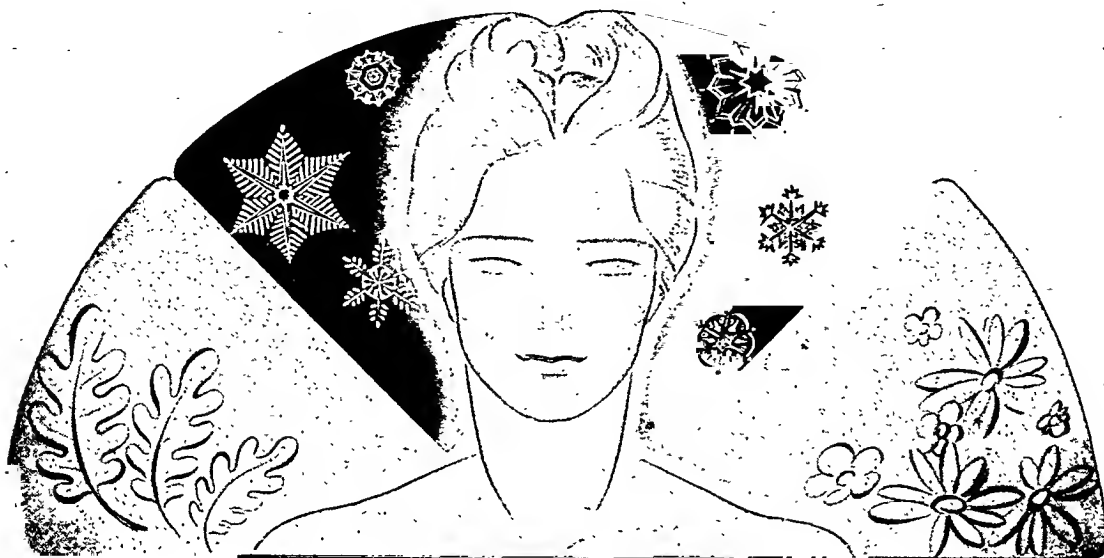
Fewer cases of scarlet fever were reported than in any year since 1915, some 5,000 children having been inoculated against this disease since 1937. There were 2,531 cases of measles, a disease against which there appears to be no means of protection. Chicken-pox accounted for 415 cases.

In the total of 3,770 cases of communicable diseases of all types in 1940, Dr. Walton does not include 501 cases of German measles reported in the last four months of the year, as "I am certain that cases of this disease were poorly reported, many occurring that we never heard of. This is explained by the fact that the disease is an extremely mild one, frequently causing no symptoms except a rash that soon disappears."

There was no smallpox in 1940. Only 29 new cases of pulmonary tuberculosis were discovered at the clinic, and but 4 cases of typhoid fever were reported.

"Tuberculosis," said Dr. Walton, "can and is being controlled. Typhoid, smallpox and diphtheria can be prevented, and much can be done to control other diseases. The prevention and control of communicable disease is of even more importance during war than at other times."

At the annual meeting of Medical Services, Incorporated, Regina, it was reported that 234 subscriptions had been paid up. The following surgical operations were performed during the year for subscribers: one sub-



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mucous resection, one hysterectomy and appendectomy, four tonsillectomies, one appendectomy, one blood transfusion, and four fractures were set.

Dr. R. McAllister, of Regina, has been appointed by the Minister of Health to the Cancer Commission to take the place of the late Dr. David Low.

The regular meeting of the Regina and District Medical Society was held on Friday, March 21st. Dr. Lorne H. McConnell, neurosurgeon of Saskatoon, spoke on "An analysis of 91 craniotomies in the treatment of epilepsy". His talk was illustrated by slides.

In answer to Dr. E. A. McCusker's request from the First Division for medical journals, the Regina and District Medical Society have sent the following journals to the First Division: *Canadian Public Health Journal*, *Canadian Medical Association Journal*, *War Medicine*, *Journal of Surgery*, also the *Year Book in Surgery*.

LILLIAN A. CHASE

### General

The Thirteenth Annual Congress of the Canadian Public Health Association will be held in the City of Quebec on June 9th, 10th and 11th. The President this year is Dr. Jean Gregoire, Deputy Minister of Health, Ministry of Health, Quebec.

## Book Reviews

**Practical Handbook of the Pathology of the Skin.** J. M. H. Macleod and I. Muende. 2nd ed., 415 pp., illust. 42s. net. H. K. Lewis, London, 1940.

This is an excellent handbook, not too long, and, at the same time, as its title indicates, practical. Macleod's work first appeared in 1903, and it is curious that his subject has attracted little or no attention until now. His book has been out of print for years; we are pleased to see his teaching brought forward again.

This book is simply and logically planned, but there is no bibliography. The descriptions throughout are excellent, especially that dealing with the minute structure of the corium and other components of the normal skin. The chapters on bacteria and dermatophytes are particularly good. The general pathologist will be impressed with the detailed instructions given for the staining of the skin. In each chapter, also, can be found methods for dealing with its special structures. The work is well illustrated with good drawings, photographs and coloured pictures.

"Macleod and Muende" stands in the front rank of "Histologies" and cannot be too highly commended.

**Man's Greatest Victory Over Tuberculosis.** J. A. Myers. 419 pp. \$5.00. C. C. Thomas, Springfield, 1940.

This is an interesting account of the men and the means responsible for the marked reduction in the incidence of tuberculosis in dairy cattle throughout the world in recent years, and the virtual eradication of bovine tuberculosis in the United States of America in the past two decades. The author gives much of the credit for this great victory over tuberculosis to veterinarians who have had the vision and the courage to translate well established facts regarding tuberculosis into action. After describing the place of the tuberculin test in the detection of tuberculosis in cattle and the effectiveness of slaughter of infected animals in the control of tuberculosis in cattle, he points out that in man chest roentgenograms of persons giving a positive intradermal tuberculin test afford a ready and reasonably accurate means for the detection of tuberculous

lesions and that segregation of contagious cases of tuberculosis is, from the standpoint of the health of the community, an effective means for the control of tuberculosis. He concludes that physicians who are interested in the control of tuberculosis in human subjects can learn many lessons from veterinarians.

**Observations Made During the Epidemic of Measles on the F  roe Islands in the Year 1846.** P. L. Panum. 111 pp. \$2.50. Am. Public Health Association, New York, 1940.

This small volume is a translation from the Danish of the observations made by Doctor Peter Ludvig Panum during an epidemic of measles on the F  roe Islands in 1846. It not only gives a fascinating description of the islands and their inhabitants, but relates as well how this recent graduate from the University of Copenhagen was selected by the University to proceed there for the purpose of combating a particularly violent epidemic of measles. His energy, initiative, and ability under conditions which offered the very best opportunities for investigation resulted in the recording of his "Observations" which have become a classic in medical literature.

One has but to consider the progress that has been made in medical science during the last fifty years to understand the difficulties that confronted investigators one hundred years ago. Without the aid of laboratories, without a great volume of established medical data, and without the instruments of precision such as we have today, this young physician by the powers of observation and assembling of results gave to medical science the life-history of measles. He established beyond doubt the infectious character of the disease and determined its period of incubation.

It was commonly believed in his day that measles might arise spontaneously, that the incubation period might be even less than ten days, and that the time of desquamation was the time of greatest danger from infection. Not knowing how the disease was carried he stressed isolation, and determined that fourteen days was the incubation period following contact with a previous case in the stage of eruption.

The life-history of this remarkable physician reveals a continual fight against conditions that would have discouraged any but a man of high ideals, abundant energy, and great perseverance. These combined with great tact and personal charm enabled him to exert a powerful influence in his later years on the development of modern physiology and medicine.

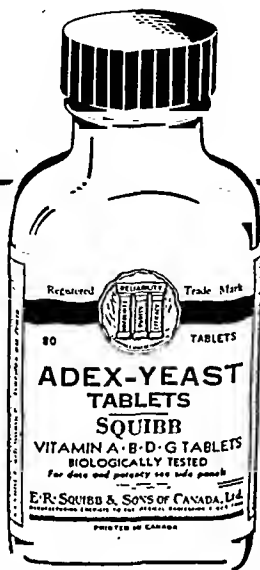
Every student of medicine should read this book, to learn how the "humdrum" of everyday practice may be turned into a stimulating adventure.

**Treatise on Medicolegal Ophthalmology.** A. C. Snell. 312 pp., illust. \$7.00. McAnish, Toronto, 1940.

The author is known widely for his numerous and fundamentally important papers on the medicolegal aspects of ophthalmology. It is not surprising, then, that a book from his pen dealing with his favourite subject should be both interesting and informative. As the author states in his preface, there has been no complete treatise on this subject since 1902, when Dr. W  rde mann and Prof. Magnus brought out their book on "Visual Economics". The rapid extension of industry and the introduction of laws of compensation for industrial injury since that time have rendered a new study of the subject imperative. This is all the more true since the advent of the war, when men are being trained in new skills and trades, with the consequent increase of industrial injury. Moreover, this is the first book which deals extensively with the fundamental principles underlying medicolegal ophthalmology.

Although the author is an American, and, therefore, deals with ophthalmic economics as it is affected by American law, the subject matter of this book is so fundamental that it is worthy of study by ophthalmologists of all nationalities. This is particularly true of his chapters dealing with the responsibilities of medical and expert witnesses, mal-practice, the evaluation of

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visual disabilities, and the application of the visual efficiency computation to medicolegal practice. There is also a valuable chapter dealing with malingering and its detection. All in all, this volume will be a most readable and valuable addition to our ophthalmological libraries.

**Microscopic Anatomy of Vertebrates.** J. I. Kendall. 2nd ed., 342 pp., illust. \$3.75. Macmillan, Toronto, 1940.

Responsibility for the 2nd edition of this work is undertaken by Professor Kendall alone, as Professor George G. Scott, the co-author of the original edition, has retired. In the new edition some text has been added, a few of the less helpful pictures in the original edition have been omitted, and many more useful illustrations have been inserted. The book is now arranged in a more systematic manner; each vertebrate sub-class is taken in order and its tissues are described. Sometimes these descriptions are rather brief, but the book aims at covering a wide field within a reasonably short space. It is an excellent textbook for students of zoology and as an introduction to the more specialized field of human histology.

**Controlled Fertility: An Evaluation of Clinic Service.** R. K. Stix and F. W. Notestein. 201 pp. \$3.00. University of Toronto Press, Toronto, 1940.

This book is of value chiefly to persons specially interested in birth control. It is in no sense a popular text, and indeed will be well nigh incomprehensible to the uninformed reader. Its purpose is to assess critically the results of organized birth-control methods. It is perhaps not fully appreciated that 100 per cent success can rarely be claimed for contraceptive methods, even though applied under the instructions of a birth-control clinic. The intelligent co-operation of the client is essential, and the less intelligent the client, the more the liability to failure on the part of the method. One of the points brought out by the study is the high percentage of clients of the clinic who abandon the instruction given them in the clinic.

Probably a considerable number of persons who consult a birth-control clinic do so because of the failure of unguided contraceptive methods. It may be assumed that many of these people are also unusually fertile, and so present to the clinic a problem of unusual difficulty. The birth-control clinic clientele cannot, therefore, be considered typical of the population at large.

The data, which furnish the basis for this volume, have been derived from the Birth Control Clinical Research Bureau of New York City, the oldest and largest contraceptive clinic in the United States. The authors, however, have no connection with the clinic. The senior author is Research Associate for the Milbank Memorial Fund, the junior author is on the teaching staff of Princeton University. The only prejudice which the authors admit to have had in approaching their problem was a belief that married couples were justified in limiting the number of their children.

From the detached nature of the study and the auspices under which it was carried out it can be safely assumed that this study is in fact a critical appraisal of birth-control clinic methods. For this reason birth-control enthusiasts should read it.

**Public Health Administration in the United States.** W. G. Smillie. 2nd ed., 553 pp. \$4.25. Macmillan, Toronto, 1940.

Works on a subject as inclusive as public health administration are prone to divide themselves into two groups—those that are primarily informative and those that are designed to assist the health officer in the better conduct of his official duties. Dr. Smillie has found it possible to incorporate enough of the so-called informative material into his book to make it of value as a record of public health progress in the United States, without its losing any of its usefulness as a guide to the field officer.

While the procedures recommended are in keeping with accepted practice and modern in their approach they

are presented without finality. If one were to be critical, it could be said that there is not sufficient emphasis on the value of accurate and adequate recording of time, money and effort expended. Such accounting is essential to the successful conduct of a community health program. The implied inclusion of an official interest by the public health administrator in the field of nutrition and its antithesis malnutrition is in keeping with the present trend.

There is an urgent need for a concise text on this subject, and the new edition of Dr. Smillie's book is strongly recommended to all those interested in the field of public health administration.

**Chronicle of Crichton Royal.** C. C. Easterbrook. 663 pp., illust. 25s. 9d. Courier Press, Dumfries, Scotland, 1940.

An admirable record of the greatest institution of its kind in Scotland by the eminent psychiatrist who was its superintendent for 30 years. Founded in 1833 by the widow of Dr. James Crichton, who had made a fortune in India and left the then enormous bequest of a hundred thousand pounds for some charitable purpose, it opened its doors six years later to some 120 patients. It now has accommodation for nearly 1,500. Beginning as a pioneer establishment for the humane and scientific treatment of the insane, it has always lived up to this ideal. An interesting feature of its statistics is the great increase of late years in the proportion of voluntary admissions.

**Syphilis in Earlier Days.** J. R. Whitwell. 90 pp. 5s. H. K. Lewis, London, 1940.

An excellent and concise review of the early literature. No entirely convincing record of pre-Columbian syphilis has yet been found in America or elsewhere, either in bone lesions or on paper, parchment or stone; but it has been the tendency of recent historians to suspect some obscure ailments in antiquity and the middle ages of having been syphilis, and to absolve our continent and the "Great Admiral" of responsibility for the pandemic of the Renaissance. Dr. Whitwell concludes "that this disease was no new one, but one that had existed from time immemorial".

**Surgery of the Hand.** R. M. Handfield-Jones. 140 pp., illust. \$4.50. Macmillan, Toronto, 1940.

This book is written in large print and on a good type of paper, so that it is easy to read. The different subjects are followed through in a simple and consecutive way. The author must be congratulated on having the energy to complete the book during wartime conditions.

Prevention of accidents, first-aid treatment, and physical therapy are stressed. Pulp infections are discussed, and the author suggests incision at the site of infection where the infection is early; in later infections lateral incisions are recommended. The horseshoe incision quite rightly is condemned. One feels that too much stress is laid on the different compartments in the finger tip, and that generally speaking, less harm would be done if the teaching were to drain pulp infections by a small incision over the site of the infection. Lymphangitis is fully discussed, and excellent treatment recommended. It is doubtful if the fulminating type described should be included, because in all probability this is septicæmia from the beginning. The author recommends late repair of cut tendons, and, naturally, this is open to debate. One feels that the operative treatment to free tendons embedded in scar tissue and surround them with grafts of fat is recommended too highly. Other less frequently seen lesions are discussed. For the treatment of trigger-finger the author suggests that a plastic operation must be performed, either on the tendon or its sheath. Probably all of these are curable by a simple incision into the tendon sheath.

Everything considered, this book should be a valuable addition to the surgeon's library. It is much easier to read than many other books on the same subject, and its simplicity and clarity recommend it.

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**Diseases of Workers:** Latin text of 1713. W. C. Wright. 549 pp. \$5.00. University of Chicago Press, Chicago, 1940.

This is the seventh in the series of Medical History publications of the New York Academy of Medicine, and makes available to English readers one of the great pioneer books, the first scientific study of occupational diseases. The older translations, 1705, 1746, etc., besides being rare and based on Ramazzini's less important first edition (1700), are very incomplete and defective; this one is scholarly and definitive, as one would expect from the translator of the "Contagion" of Fracastorius. The introduction and notes are most informative. Mrs. Wright, who is Professor of Greek at Bryn Mawr, deserves well of our profession.

**Textbook of Medicine.** Edited by J. J. Conybeare. 5th ed., 1131 pp. \$7.25. Macmillan, Toronto, 1940.

This is the fifth edition of this well-known textbook. There has been re-writing of several sections, particularly on the sulfanilamide group of drugs; also a new chapter on congenital cystic disease of the lung. The book is sound and clearly written.

**Obesity and Leanness.** H. R. Rony. 300 pp., illust. \$4.25. Macmillan, Toronto, 1940.

Here is a book which goes into the whole subject of obesity and leanness exhaustively. Almost six hundred references are made to the literature on metabolism. The chapter on caloric balance contains a good discussion of hunger mechanism. Why does the obese person eat independently of his caloric requirement? What is wrong with the mechanism that normally adjusts appetite to caloric output? What part of this mechanism is primarily disturbed—the peripheral neurogastric hunger apparatus, or its chemical, glandular or cortical control?

It may be a surprise to learn that "practically all investigators agree that the basal metabolism is within normal limits in the great majority of obese persons". The endocrine system and the nervous system each have a chapter, then fat, carbohydrate and protein metabolism are taken up in detail. Lipophilia is given a chapter. The rôle of heredity is discussed. "The ultimate problem of the inheritance of obesity and leanness is to find out which tissue or organ *Anlagen* carry the genetic factors that make for the fat content of the body. Are they inherent in genes of endocrine glands (and which endocrine glands) or of the nervous system, or the peripheral fat deposits? Or are there specific independent genes for obesity and leanness which are transmitted either alone or else in linkage with genes of endocrine or other anomalies?"

The clinical aspects of obesity and leanness, together with therapy for these conditions, are fully covered.

This is a book for anyone interested in metabolism, whether that person be an internist or a dietitian.

**Venereal Diseases.** E. T. Burke. 549 pp., illust. 30s. H. K. Lewis, London, 1940.

In this book the whole field of venereal diseases is covered in a fairly concise manner. Short chapters are devoted to the more unusual infections, e.g., *Trichomonas* which is called "*Trichomonas Donne*" infestation rather than *vaginalis* since the disease is seen in both sexes. Treatment is given in considerable detail, including the latest additions to armamentarium, such as the sulfonamides and artificial fever. Treatment is largely along accepted lines and is sound.

Some view points, while they may have much to commend them, are at too wide variance with accepted teaching to be advised for the beginner. The author explains the whole behaviour of syphilis on a lipid concept. "The organism is an intense lecithin-globulin complex. It exhibits a marked predilection for the tissues of the host which, like itself, are rich in lipoids. Its favourite habitat is the perivascular lymph spaces of vessels associated with such lipid rich organs and tissues."

Or again "the difference between the two sexes is a metabolic one and can only be expressed in terms of

lipoids. One is forced irresistibly to the conclusion that the mildness of syphilis in the female is due to her high degree of lipid richness. This may cause her to produce more of the protective lipo-proteolytic ferment and a higher proportion of it will be anchored to her tissues than to those of the male. They will thus be better protected from treponemal attack. "The female may legitimately on these grounds be regarded as the natural host of *T. pallidum*. She lives with the parasite in greater symbiotic amity than does the male. Syphilis does her less harm than it does her husband. She tends to become a carrier."

The bacteriology of gonorrhœa is well presented in line with the growing rise of cultural methods. Here, too, novel and fascinating views are expressed as to mutation forms and symbiosis of the organism that are not generally accepted. However, the imagination is sharpened.

**Surgical Anatomy of the Head and Neck.** J. F. Barnhill and W. J. Mellinger. 2nd ed., 773 pp., illust. \$15.00. University of Toronto Press, 1940.

A second edition of this work has now been published. It shows some improvements over the first one; the illustrations are placed in closer proximity to the relevant text and several fresh ones have been added. But the work still remains a text-book written by an otolaryngologist and bears the imprint of its origin on every page. Its outlook is more surgical than anatomical, and points bearing on otolaryngology are fully discussed while other matters are ignored or given a cursory description. The cervical spinal column is not even mentioned, for instance, the temporo-mandibular joint is almost wholly omitted, and the lymphatic system is given only a few passing and brief references. The book contains a great amount of information of value to an otolaryngologist but interspersed through this information is a considerable amount of trivial and exceedingly elementary matter such as would hardly be needed by a student of what purports to be an advanced practical text-book. The doggerel rhyme about the cranial nerves on page 698 is an outstanding example of these trivialities. Perhaps this information may not be so unnecessary in places where anatomy occupies a very subordinate position in the curriculum of many medical colleges. The book is well printed and illustrated, but some of the illustrations are more striking and ornamental than informative.

**The Care of Psychiatric Patient in General Hospitals.** F. G. Ebaugh. 79 pp. \$1.00. American Hospital Association, Chicago, 1941.

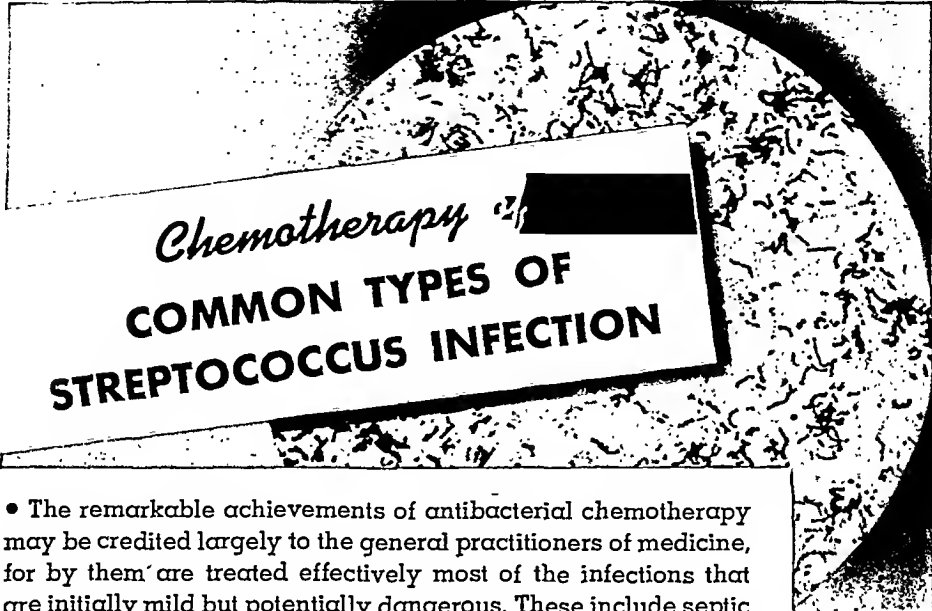
This timely little volume was prepared as a study publication of the Council on Profession Practice of the American Hospital Association, to focus attention upon the obvious need for greater interest in psychiatric states upon the part of those who staff general hospitals. Psychiatry is now regarded as a fundamental of general medical practice, and more general hospitals should have psychiatric divisions. It is pointed out that such an arrangement is better for the patient and for the medical staff, it provides additional highly desirable educational features for the nurses and interns, and is not the serious economic or administrative problem for the hospital which is commonly thought. Chapters are included on organizational requirements, on methods of psychiatric study and on principles of management. This study should stimulate interest in this desirable development.

## BOOKS RECEIVED

**Minor Surgery.** R. J. McNeill Love. 370 pp., illust. 12s. 6d. H. K. Lewis, London, 1940.

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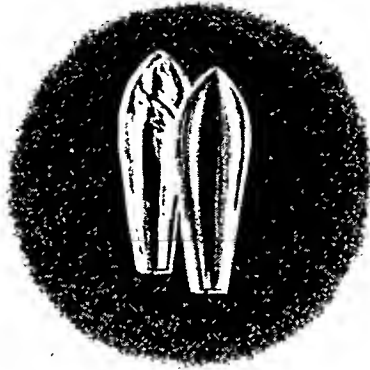


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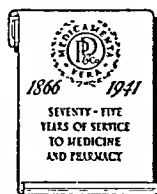


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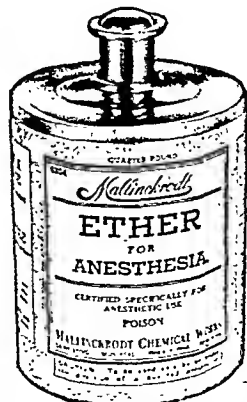
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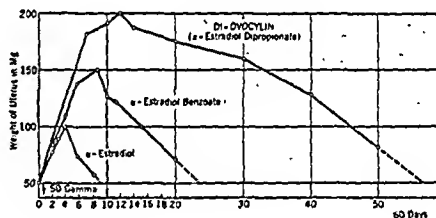
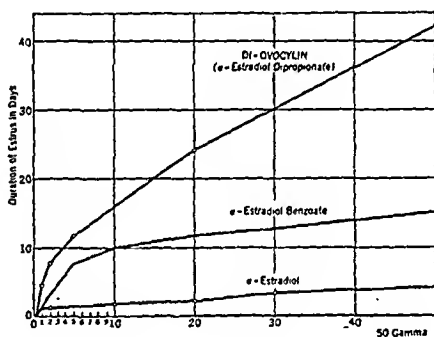
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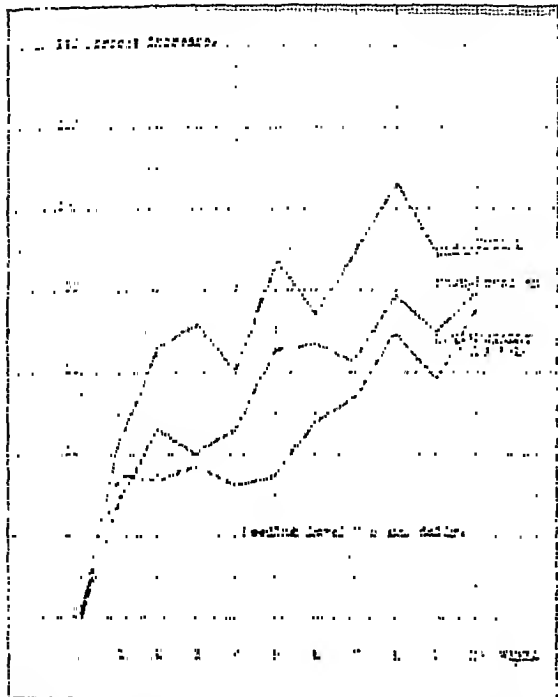
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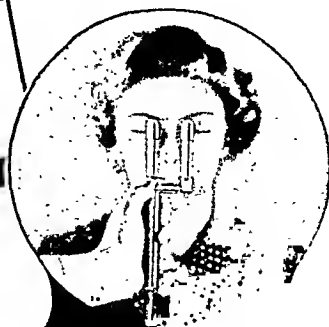
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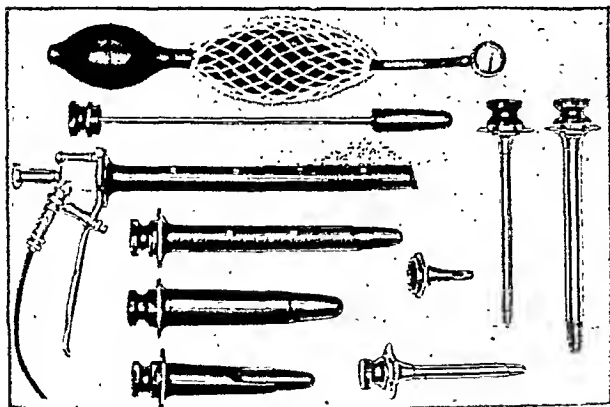
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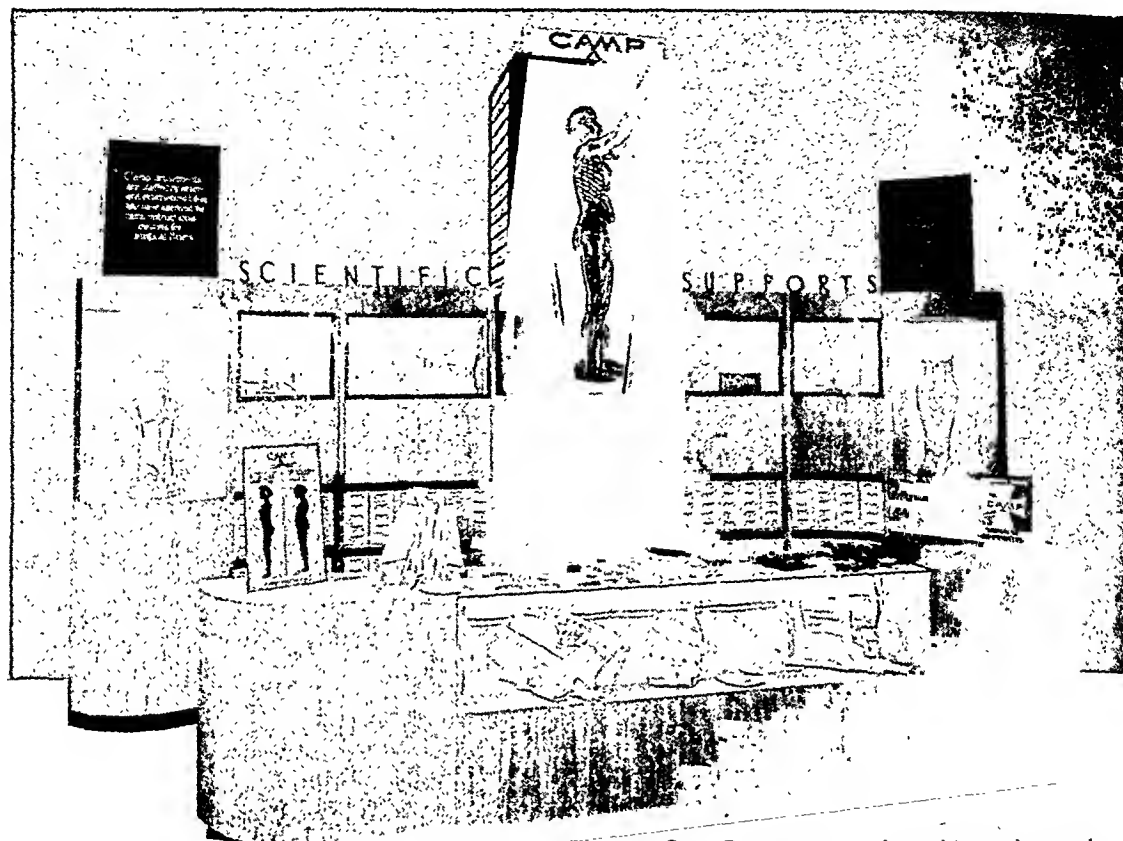
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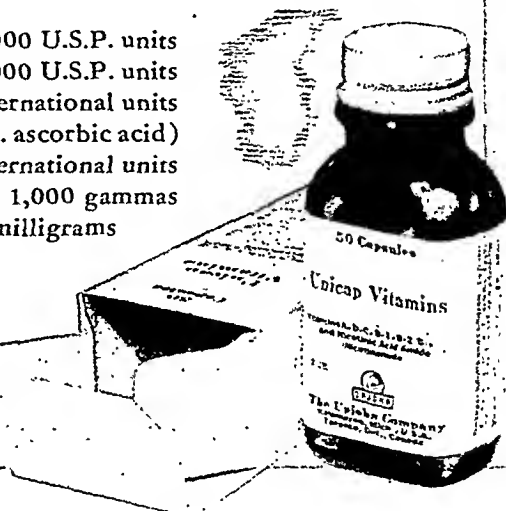
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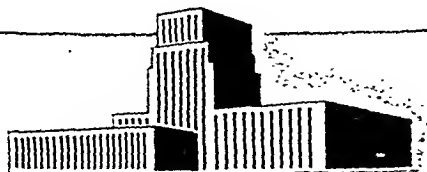


No longer need the patient have the inconvenience and the expense of taking, separately, the fat-soluble vitamins—the vitamins of the B complex group and vitamin C. Now only one Unicap\* a day is necessary to fortify the average diet. A capsule taken regularly each morning soon becomes a part of daily routine. This results in simplicity and economy in vitamin administration.

*Unicap  
Vitamins*

are available from your  
prescription druggist in  
bottles of 50

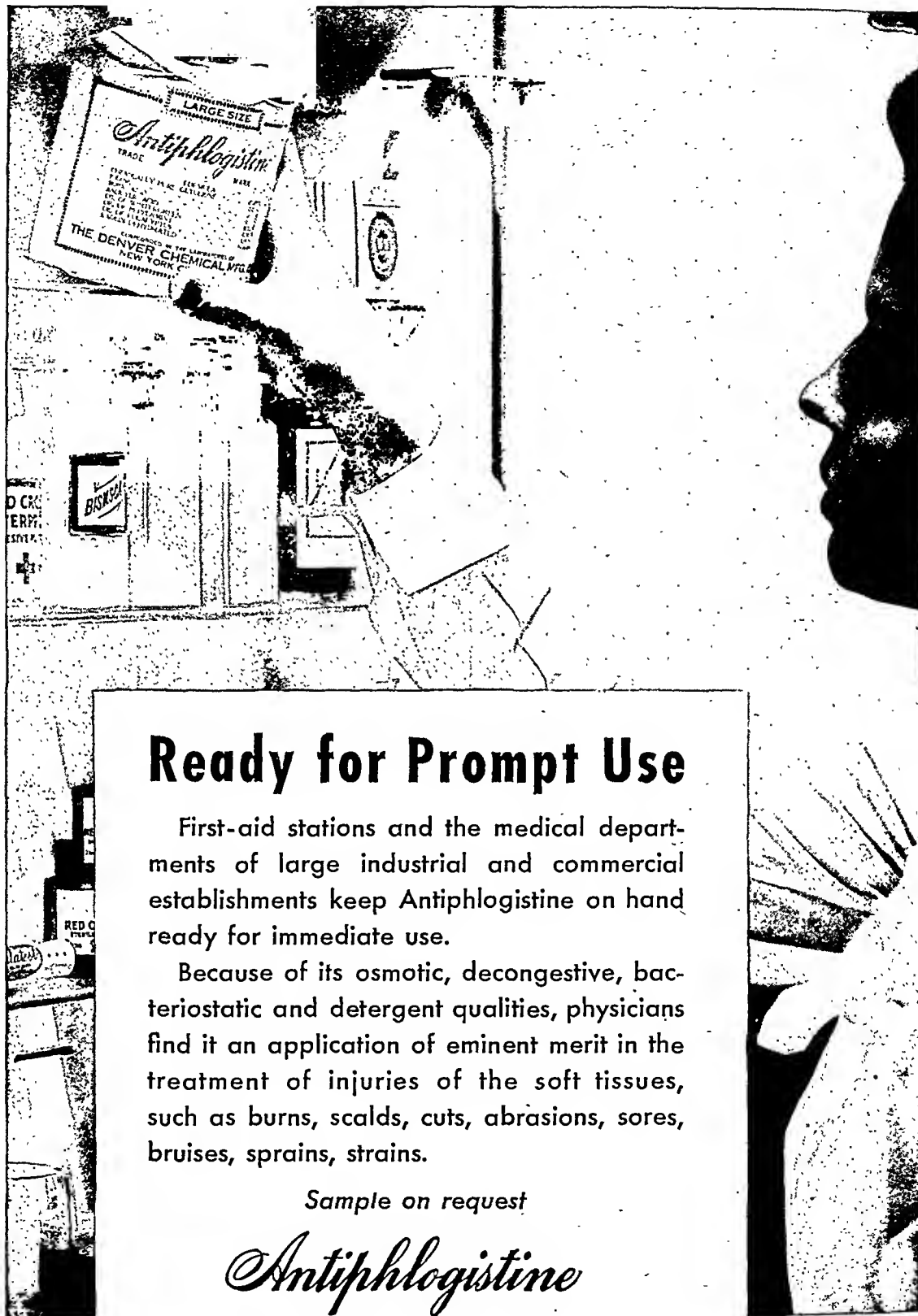
\*Trademark



Upjohn

\* Fine Pharmaceuticals Since 1886 \*





## Ready for Prompt Use

First-aid stations and the medical departments of large industrial and commercial establishments keep Antiphlogistine on hand ready for immediate use.

Because of its osmotic, decongestive, bacteriostatic and detergent qualities, physicians find it an application of eminent merit in the treatment of injuries of the soft tissues, such as burns, scalds, cuts, abrasions, sores, bruises, sprains, strains.

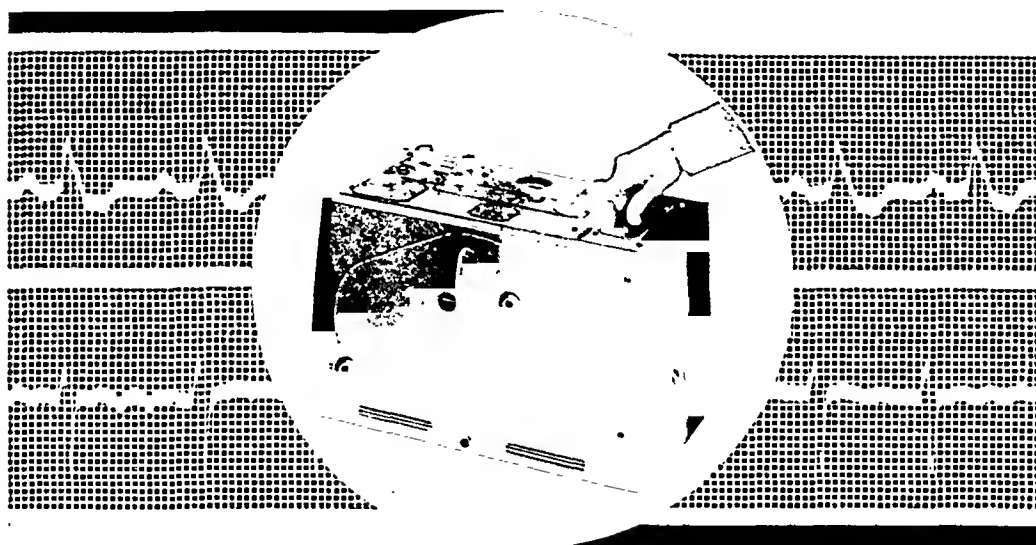
*Sample on request*

*Antiphlogistine*

**THE DENVER CHEMICAL MANUFACTURING COMPANY**

153 LaGauchetiere St. W. - - - - - Montreal

## The delight of precisians in diagnosis



## The accurate G-E portable Ekg.

OUR users who pride themselves on the rigid precision of their heart diagnoses are our best advertisement for the G-E Electrocardiograph. The accurate electrocardiograms it produces so easily and consistently help them to confirm and supplement their clinical judgment. These exact, graphic records of the heart's action are the result not only of the instrument's exclusive, scientifically correct design, but also of its careful, sturdy construction and simple, dependable operation.

If you have not yet taken the opportunity to see a practical working demonstration in your own office, you cannot fully appreciate the G-E Electrocardiograph's possible advantages in your practice. For such a demonstration, or for a booklet of unusually interesting information on electrocardiography with this inexpensive instrument, simply address Dept. L15.

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*Learn what these features mean  
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**ACCURACY...** Records accurately the minute changes in heart waves, including their higher frequency components; high response to all frequencies present in wave assures accurate measurement of R-wave amplitude. Skin capacitive effect nil—hence "over-shooting" impossible. Variations in patient's resistance do not require adjustment of galvanometer, therefore deflection time is constant.

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# To Inspire CONFIDENCE

When the physician relieves pain, he does a great deal to inspire confidence and insure the patient's co-operation in further therapeutic measures.

As an effective means to this end, Aspirin has been widely used by the medical profession for 40 years. Analgesic and antipyretic, Aspirin is especially useful in relieving the painful symptoms of influenza, colds, neuralgia, rheumatic affections, fibrositis, dysmenorrhea and headache.

Aspirin is chemically pure, almost completely free from dissociated salicylic and acetic acids.

Each tablet of Aspirin contains the full dosage of the pure drug.



*We shall be glad to forward you professional samples of Aspirin on request.*



Trademark Reg. in Canada

THE BAYER COMPANY, LIMITED, 1019 Elliott Street, West, Windsor, Ontario

## CANNED FOODS IN THE MODERN PATTERN OF NUTRITION

● Generalities as to human nutritive requirements are of but limited use in the practical application of our modern knowledge of nutrition. This is particularly true where expert and experienced advice on diet formulation is not readily or conveniently available. For those concerned with actual diet planning or administration, more specific information on nutrition is desirable.

During recent years, several excellent texts have become available which present reliable guidance in diet planning (1, 2, 3). One important factor governing conformance with any diet pattern, of course, is the economic status of the individual, family, or group. A recent text presents a workable system in which rather full consideration has been given to this factor (1).

Under this pattern, the common foods have been classed according to their nutritive contributions into some 12 groups. These groups include milk; potatoes and sweet potatoes; mature dry legumes and nuts; tomatoes and citrus fruits; leafy green and yellow vegetables; other vegetables and fruits; eggs; lean meat, poultry, and fish; flour and cereals; butter; other fats; and sugar. There will, of course, be quantitative differences in the nutritive values of individual foods within a single group. However, there is sufficient similarity so that the foods within a group can be used interchangeably as conditioned by factors such as availability, relative costs, and personal, racial, or religious preferences. In order to minimize variation of nutritive values obtained from each food group, it has been suggested that as wide a variety of foods within a group, as practical, be consumed.

In connection with this diet plan, desirable yearly food allotments for persons of various sex, age, or conditions of life are also listed in terms of these twelve food

groups. Thus, from information regarding the sex, age, and activities of the members of a family or group, one can compute the yearly amounts of the various foods which should be provided. From the sum of these yearly totals, the food allowances per week or month for the family or group can be estimated. The latitude in the choice of foods, within the twelve specified food groups, makes the diet pattern more adaptable to situations where the economic factor must be considered.

Estimation of food requirements in this manner provides a practical method of diet planning designed to supply the nutritive requirements of an individual, a family, a group, or even a nation. However, the ultimate achievement of an improved nutritional status is dependent upon a readily available supply (at all times) of the various common foods at reasonable cost. It is apparent from the listing of the twelve food groups that many materials of a perishable nature—which are not conducive to year-round production near the centres of large populations—are indispensable in supplying the dietary requirements of our people. Thus, the transportation and storage of foods, in such a manner as to retain nutritive values, are important problems to be considered.

Needless to state, commercially canned foods are well adapted for use in this diet plan. Commercial canneries are located near the sites of abundant supply of freshly harvested foods. The canning processes convert the perishable foods into nutritious canned foods which can be economically transported and marketed throughout the year. Hence, the canning industry plays an important role in the practical aspects of diet planning to improve the nutritional status of the Canadian people.

### AMERICAN CAN COMPANY

MONTREAL . HAMILTON . TORONTO

AMERICAN CAN COMPANY, LTD. . VANCOUVER

1. 1939. Food and Life: Yearbook of Agriculture, U. S. Dept. of Agriculture, U. S. Govt. Printing Office, Washington, D. C.

2. 1939. Accepted Foods and Their Nutritional Significance. Council on Foods of the American Medical Association, (Chicago)

3. 1940. J. A. M. A. 114, 244.

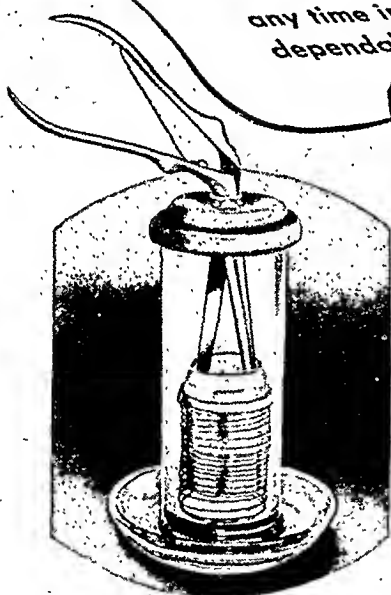
## BARD-PARKER FORMALDEHYDE GERMICIDE

*recognizes the validity of but one  
testimonial . . .*

There are more clinicians and  
hospitals routinely using this  
superior disinfecting medium  
in the preoperative preparation  
of surgical instruments than at  
any time in the history of this  
dependable product.



# WHY?



Have you examined this new yet vital link in  
the chain of sterility?

### BARD-PARKER STERILE TRANSFER FORCEPS

insure the aseptic transportation of sterile in-  
struments and dry supplies to the operative  
field.

□□□ Its rapid bactericidal effectiveness  
against vegetative bacterio, spore-formers and  
their spores, even in the presence of blood pro-  
tein and tissue exudate.

□□□ Its ability to prolong the factory-  
new characteristics of delicate instruments by  
protecting keen edges, points and other pre-  
cision parts from rust and corrosion.

□□□ The solution does not lose its ger-  
micidal effectiveness nor deteriorate with  
evaporation or over long periods of use.  
*It is decidedly economical to buy . . .  
economical to use.*

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## *Your patients deserve the best!*

The position of leadership achieved by Tampax in the realm of internal hygienic protection, is a tribute to outstanding merits which physicians fully appreciate in recommending its adoption by their patients:

- • **in design.** Tampax was pioneered by a physician. It was the first commercial tampon to make available to women everywhere the well-recognized advantages of internal absorption.
- • • **in absorptive efficiency.** Laboratory tests indicate the exceptional absorptive capacity of Tampax as compared with that of other standard tampons of equivalent cross-section area.
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- • • **in convenience.** The Tampax pledget—compressed to small diameter—is placed in the upper vaginal vault by an individual applicator, so utterly simple as to permit the most ready dainty insertion.
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No other tampon can approach Tampax in this comprehensive leadership. Over fifty thousand physicians and more than fifty-five thousand nurses have personally requested samples—to demonstrate its high compression of finest surgical cotton, cross-fibre stitched to prevent disintegration . . . its unique individual applicator . . . and its moisture-resistant cord for gentle removal. Its positive wick action prevents any blocking of the flow, and its three sizes—Super, Regular, Junior—adapt it to individual need. For a professional supply, use the coupon below.

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# TAMPAX

*Functionally designed for  
truly hygienic protection*

Canadian Tampax Corporation Ltd.  
533 College St., Toronto, Ont.

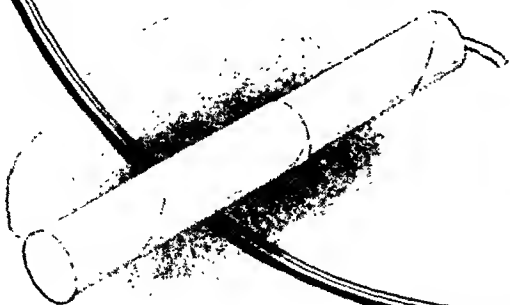
Gentlemen: Please send me a professional supply of  
Tampax.

Dr. \_\_\_\_\_

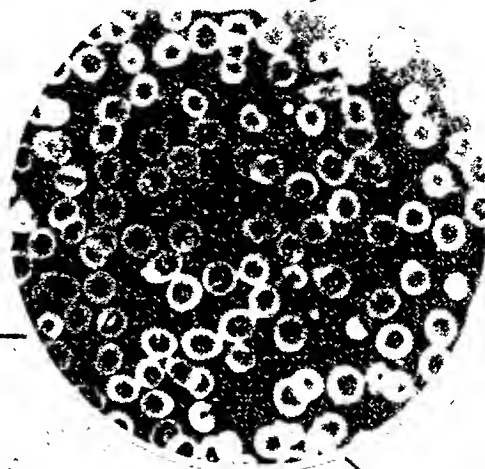
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City \_\_\_\_\_ Prov. \_\_\_\_\_

Accepted for advertising by the Journal  
of the American Medical Association.



# IN NUTRITIONAL ANEMIAS . . .



**E**VIDENCE increasingly indicates the frequency of nutritional anemia. Particularly after a trying winter, such a tendency is likely to be most pronounced, and deserves careful consideration.

The value of iron therapy in the relief of any of the hypochromemias—whether nutritional, idiopathic, or associated with some other fundamental blood dyscrasia—often depends on the form of its administration. In Endomin, iron is effectively implemented with copper, as well as with balanced proportions of five other metals, which act synergetically to effect maximum hemoglobin regeneration.

Endomin is readily assimilable, non-irritant, and easy and pleasant to take. It does not tend to produce nausea, constipation, nor flatulence.

*Formula:* Each tablet contains in the form of salts of higher fatty acids: iron 8.0 mg.; copper 0.6 mg.; manganese 0.4 mg.; zinc 0.3 mg.; nickel 0.03 mg.; cobalt 0.03 mg.; with sodium germanate 0.05 mg.

*Available:* In bottles of 100, 500, and 1,000 tablets.

*Dosage:* 1 to 3 tablets t. i. d. after meals.

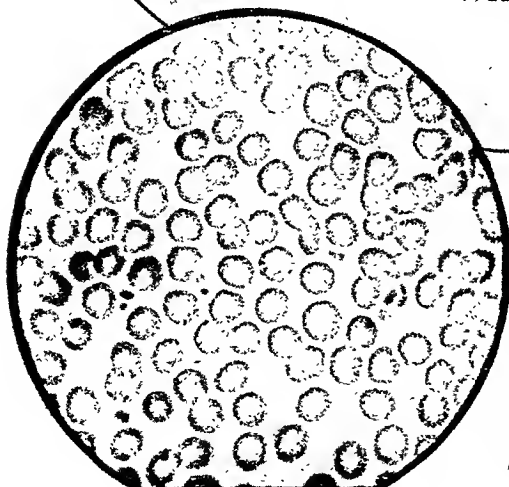
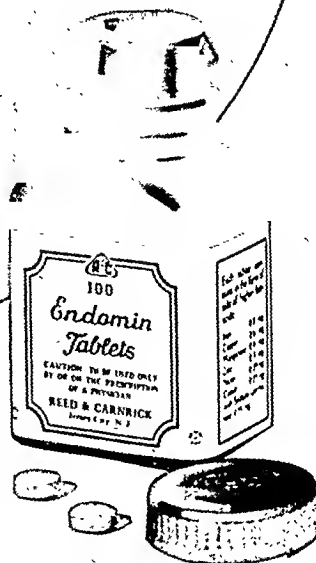
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TORONTO, ONTARIO

*Write for samples  
and literature*

Manufactured under  
license from the  
Wisconsin Alumni  
Research Foundation

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# ENDOMIN





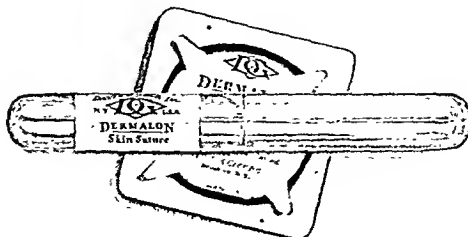
# DERMALON

SKIN AND TENSION SUTURES PROCESSED FROM NYLON

DERMALON sutures are the product of two and a half years of research and clinical observation in the development of a synthetic monofilament strand conforming to Davis & Geck's high standards of stability, strength and compatibility with the tissues.

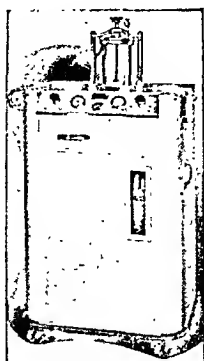
Smoothness, elasticity, and impermeability are characteristics of the basic substance—nylon. Permanence of color, uniformity of size and other qualities essential to satisfactory use and behavior are assured by D&G processing. Fully tested under varying conditions and thoroughly

proven by clinical experience, Dermalon sutures are now available in sizes 4-0 to 0 for skin closure and in sizes 1, 2 and 3 for tension suturing. They are supplied in various lengths — heat sterilized in hermetically sealed glass tubes, or in 190-inch lengths on convenient dispensing reels.



DAVIS & GECK, INC., 217 DUFFIELD STREET, BROOKLYN, N. Y.





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## EXPLOSION PROOF

Even in Ethyl-Ether Atmosphere

— C.E.S.A. Approval No. 5700 —

Gomco proudly announces the first and only suction and ether Pump Units with electric equipment fully approved also by the Underwriters' Laboratories for use in Ethyl-Ether atmosphere (Class 1 Group C).

These newsworthy pump units incorporate many other important exclusive Gomco features, assuring long superlative service. The unit illustrated is but one of the various models now available. Write for detailed literature; learn how these units will fit your requirements.

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87-91 Ellicott Street

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Makers of over 75 professionally designed surgical suction and pressure pump units.

### NEW and IMPROVED LaMotte Falling Drop Densimeter (Two Models)

An important adjunct in treating cases of shock. For determining blood proteins, albumin-globulin ratio and specific gravity of body fluids. These units are produced exclusively with the cooperation of H. G. Barbour and W. F. Hamilton, and approved by them. This outfit is now available in 2 models—the larger model comes complete for \$65 and the small model at \$35. Prices F.O.B. Towson, Md. Send for complete information.

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Dept. "CP" Towson, Baltimore, Md., U.S.A.

### VALUE TO HEALTH OF VITAMIN E RECOGNIZED Kelly's Wheat Germ Oil Ensures Freshness

Obstetricians recognize the value of Vitamin E in cases of habitual abortion, threatened abortion and mild partial separation of the placenta. During cases of normal pregnancy the health of mother and child may be assisted by Vitamin E.

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Doctors should prescribe Kelly's Wheat Germ Oil in cases where Vitamin E is of value.

*Free samples and literature on request.*

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# PEDICULOSIS

caused by head, body or crab lice, cleared  
up — usually in one application.

*Cuprex destroys the nits as well  
as the lice. No unpleasant  
odor — not sticky. At  
all drug stores.*

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**A MERCK PRODUCT**  
MERCK & CO., LIMITED, MONTREAL



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Should be identified individually.  
Lost laundry, mislaid linen, wrongly

used towels mean losses in money, in time, in sanitation.  
**CASH'S WOVEN NAMES** stop these wastes, cut replacement costs, identify instantly. The sanitary permanent method of marking. Quickly attached with thread or Cash's No-So Cement (25c a tube).

LET US FIGURE ON YOUR NEEDS—WHETHER PERSONAL  
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<b>PRICES:</b>	12 doz. \$3.00	9 doz. \$2.50
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Ask about our special larger size tape for attaching  
to sleeves and caps of uniforms.

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★ High Absorptive Capacity

★ Freedom from Caking

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# SODASORB

\*T. M. Reg. Canada

AN IMPROVED WILSON SODA LIME

**DEWEY & ALMY CHEMICAL CO.  
OF CANADA, LTD.**  
LA SALLE, MONTREAL, QUEBEC, CANADA

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Children and sensitive adults co-operate willingly when Lavioris is prescribed as a gargle.

Diluted with equal parts of hot water, Lavioris effects a free removal of viscid accumulations and a maximum reduction of organisms. This thorough cleansing, together with the astringent action of Zinc Chloride, has a decidedly beneficial and comforting effect upon inflamed tonsils and membranes.

# LAVORIS

Professional trial package  
gladly sent on request.

Made in Canada by

**LAVORIS CHEMICAL COMPANY LTD.**  
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# IRO-B

(Trade Name Reg'd)

Sugar Coated Yellow Tablet

Each tablet contains:

Iron Sulphate Exsiccated	3 grs.
Copper Sulphate C.P.	1/100 gr.
Manganese Sulphate C.P.	1/100 gr.
Vitamin B <sub>1</sub> (Thiamin Chloride)	.3 mg.
(100 International Units).	
Nicotinic Acid	5. mg.

INDICATIONS—Secondary Anemias, Anemia due to malaria, conditions occurring during pregnancy, such as anemia, vomiting, constipation, neuritis, etc.

DIRECTIONS—One or two tablets three or four times daily as directed by Physician.

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LIMITED  
LONDON - CANADA

# IS THERE AN ARTHRITIS-ECZEMA SYNDROME?

Both are claimed to be allergic. Both suggest mineral deficiency and impaired elimination. Clinically, each is symptomatically improved by the oral use of

# LYXANTHINE ASTIER

which combines the therapeutic actions of iodine, calcium, sulphur, and lysidin bitartrate—a potent eliminator of endogenous toxic waste.

Since the best evidence is clinical evidence, write for literature and sample.

L-16

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**ROUGIER FRERES**  
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# A Rational Emmenagogue

When menstrual irregularities are due to lack of uterine tone, a formula which stimulates the uterus directly and promotes its circulation is beneficial.

Such a formula may be utilized in Apergols (Wampole), which tone the uterine musculature and promote its normal circulation.

Apergols (Wampole) are indicated in amenorrhœa, especially when the condition is present in anæmia; also in atonic menorrhagia and dysmenorrhœa.

Each capsule contains apiol 5 mins., oil savin  $\frac{1}{2}$  min., ergotin 1 gr., aloin  $\frac{1}{8}$  gr.

*Samples for clinical trial free to physicians*

**HENRY K. WAMPOLE & CO. LTD.**

*Manufacturing Pharmacists*

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**DR COLLECTEM**



**"OH, YES! HE'S PROUD  
OF HIMSELF — NOW!"**

But it may need good work on our part to finally bring you in the money.

A large number of Young Canadians are paid for—by cheques from The Medical Audit Association on the Imperial Bank.

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*You'll be well pleased with  
the speedy results, Doctor,  
and our courteous methods!*

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**MAIL US YOUR LIST TO-DAY!**

# MOLSON'S ALE

**FAMOUS FOR PURITY  
AND WHOLESOMENESS**

*SINCE 1786*

# THE BRITISH NAVY

## IS USING

# GENTIAN VIOLET JELLY

## FOR BURNS

\*Surgeon Rear Admiral Wakely in discussing burns due to gun flash, bombs, incendiary bombs, gasoline, says, "with regard to local treatment the surgeon favours Gentian Violet Jelly . . . applied to burned areas without cleansing. The application should be liberal, for it is painless and soothing. It would seal off the burned area and form a crust which remains until arrival at the hospital. Tannic Acid should not be used on the hands and face."

## VIOLANCA-GEL

(Gentian Violet Jelly Anglo Canadian)

Already extensively used in Canada for first, second- and third degree burns, for slow-healing ulcers, wounds, bed sores, deep sunburn, etc.

— Favours scarless healing —

VIOLANCA-GEL (No. 5166)

Available in 2 oz. and 4 oz. collapsible tubes.

(Clinical Sample Sent Free on Request)

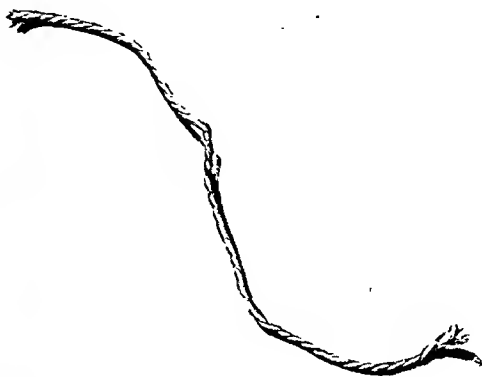
## ANGLO CANADIAN DRUG COMPANY

Manufacturers of Fine Pharmaceuticals

OSHAWA

CANADA

\*A.M.A.J. Vol. 116, No. 4, P. 326.



Dear Doctor—

can you use this piece of string?

A PIECE OF STRING comes in handy to tie around your finger when there's something you want to remember. We use it here to remind you that . . .

**1. The caffeine in coffee**, (even in small amounts), may dull the sense of fatigue, at the same time causing the sleeplessness that robs the system of rest. Also, as you well know . . .

**2. The use of coffee** may be contraindicated in certain cardiac and nervous conditions. If continued, its use may cause loss of appetite, pulse irregularity, constipation, diarrhea, etc.

**3. And the effects** of caffeine, like the effects of any stimulant, may last as long as 48 hours, in many cases!

**4. Many physicians**, at the first sign of harmful effects from caffeine, tell the patient to "Switch to Sanka Coffee."—Because Sanka Coffee is 97% caffeine-free, and so cannot produce any of the harmful effects due to caffeine.

## SANKA COFFEE



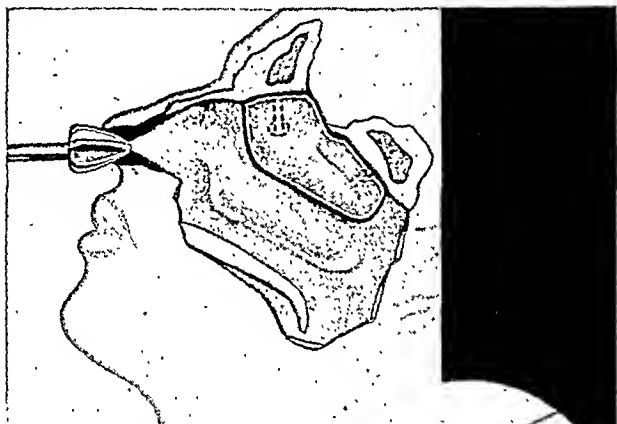
REAL COFFEE — 97% CAFFEINE-FREE

**NOTE TO DOCTORS:** Sanka Coffee has been accepted by the Council on Foods of the American Medical Association with the statement: "Sanka Coffee is free from caffeine effect and can be used when other coffee has been forbidden." Sanka Coffee is available in both "regular" grind and "Crip" grind. Make it strong . . . a heaping tablespoon to a cup.

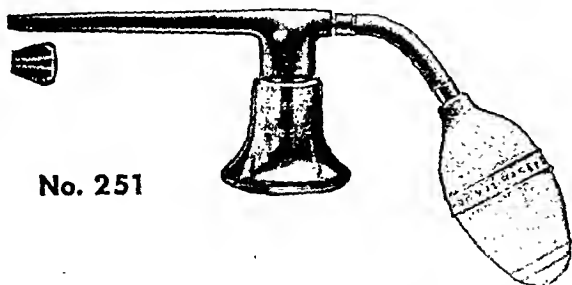
# NOSE DROPS...

*Atomized*

MEAN BETTER HOME TREATMENTS



• Medicaments applied to the nose with a dropper may never reach the affected areas. They only follow the floor of the nasal cavity, unless a complicated bending technique is used. But drops *atomized* will permeate all areas of the nose and are sure to reach the affected portions. X-ray photos illustrate this. So, when you prescribe nose drops for home treatment of nasal disorders, always recommend a DeVilbiss Atomizer for more thorough application and better results.



No. 251

## DEVILBISS

The DeVilbiss Mfg. Co., Limited, Windsor, Ontario,  
headquarters for atomizers and vaporizers  
for professional and home use

TIME AND EXPERIENCE

*have approved*  
**Sanmetto**

For more than fifty years many physicians have prescribed Sanmetto with satisfactory results in disorders of the urogenital tract.

Alone or combined with other indicated medication this **soothing preparation** provides added comfort to your patients, lessens possible drug irritation.

Sanmetto is a preparation of Sandalwood, Saw Palmetto and Corn Silk. Alcohol 20.6%. One to two drams every four hours, four times a day, is considered the optimum dose.

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*Pharmaceutical Chemists—*  
4500 Parkview Place ST. LOUIS, MO.

# Pure Dextrose

(d-GLUCOSE POWDER)

now obtainable under the trade name

## DEXTROSOL

Produced in Canada under most hygienic conditions, and conveniently packed in sanitary containers of one pound and five pounds content.



Conforming to the Standards of The British Pharmaceutical Codex and U.S. Pharmacopoeia

Indicated as a valuable item of dietary treatment in Alimentary Diseases, in Disorders of Pregnancy, in Nutrition of the Newborn, in Metabolic Disturbances.

### DEXTROSOL

—a white crystalline sugar, mildly sweet, highly stable, neutral in reaction, and easily soluble in cold or hot water.

Can be administered orally or intravenously, as required by contingency.

Dextrosol is advertised to the Medical Profession only.

*Further information gladly supplied on request.*

Sole Distributors for Dextrosol  
**THE LEEMING MILES CO. LTD., MONTREAL**

Manufacturers:  
**THE CANADA STARCH COMPANY LIMITED**

# THE SPHERE OF *Usefulness* FOR

# IODEX

### DESCRIPTION

Iodex is an ointment containing *iodine in organic combination*, the iodine loosely combined with a fatty organic carrier suspended in a petrolatum base. Chemical name: Mono-iodo-oleic acid.

### ACTION

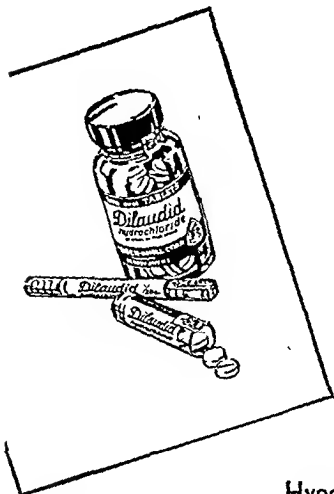
As long as Iodex remains in contact with body tissues in minor cuts, wounds, abrasions, iodine gradually separates from the molecule of the carrier substance and inhibits the growth and action of bacteria and promotes healing.

On unbroken surfaces of the living body Iodex is absorbed into the skin, oxidation slowly liberating the iodine from the carrier.

Sample and Literature Upon Request

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COUNCIL ACCEPTED



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(dihydromorphinone hydrochloride)

For the relief of pain, Dilaudid hydrochloride has several advantages over morphine. It is a stronger analgesic, acts more quickly, and is less likely to cause undesirable symptoms.

Hypodermic and oral tablets, rectal suppositories, ampules, and powder.

DOSE: Dilaudid hydrochloride 1/20 grain will usually take the place of 1/4 grain morphine sulphate.

Dilaudid, Trade Mark reg. Canada.  
Manufactured by Bilhuber-Knoll Corp.

**MERCK & CO. Ltd.** Selling Agents 560 De Courcelles St., MONTREAL



*Welcome Relief in Menstrual Disturbances with*

A HIGHLY efficient emmenagogue, Ergoapiol acts to normalize menstrual function by inducing pelvic hyperemia, and stimulating smooth, rhythmic uterine contractions. It also constitutes a desirable hemostatic agent to help control excessive bleeding.

## ERGOAPIOL

(Smith)

### INDICATIONS

Amenorrhea, Dysmenorrhea, Menorrhagia, Metrorrhagia, Menopause, in Obstetrics.

### DOSAGE

One to two capsules three or four times daily.

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In ethical packages of 20 capsules.

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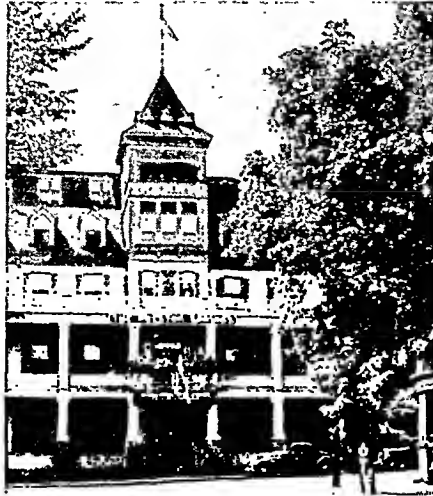
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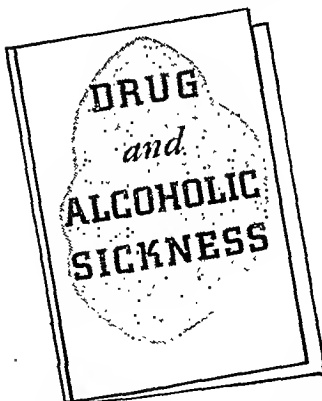
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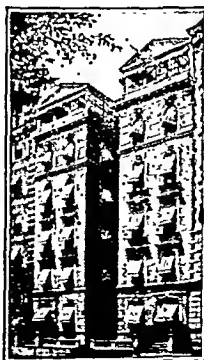
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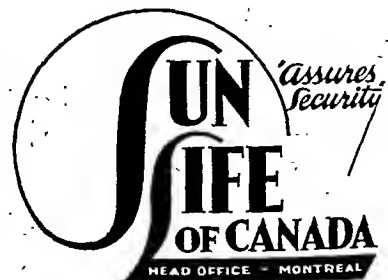
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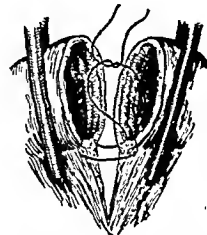
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## Objects:

- To assist in the defence of its members in cases of alleged malpractice, and to encourage honourable practice in the daily work of the medical profession.
- Subject to our by-laws, assistance is given by the payment of the taxable costs of actions together with reasonable counsel and witness fees in cases undertaken by our Association, as well as damages if awarded.
- All members in good standing of the Canadian and various Provincial Medical Associations may be enrolled upon signing the application form and paying the annual fee.
- All other regularly qualified practitioners must have their application countersigned by two members of our Association.

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Signature \_\_\_\_\_ Address \_\_\_\_\_

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Oral Examinations in the Primary subjects and Oral and Clinical Examinations in the Final subjects at Montreal on October 21st and 22nd—At Toronto on October 23rd and 24th.

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No particular list of text books or syllabus is recommended to cover any subject. All candidates are expected to demonstrate a thorough knowledge of the subjects in which they are to be examined and to be familiar with the current literature relating thereto.

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Montreal—Apply, Dr. W. de M. Seriver—1374 Sherbrooke Street West, Montreal, P.Q.

DIVISION of SURGERY:—

Montreal—Apply, Dr. R. R. Fitzgerald—1414 Drummond Street, Montreal, P.Q.

A SPECIAL Examination in the Primary subjects for English-speaking candidates will be held on the following dates:—Written Examinations—Friday, May 30th. Oral Examinations at *Toronto only*—Tuesday, June 17th; Wednesday, June 18th.

Candidates who are graduates of 1930 or prior thereto of a Medical School or University approved by Council shall not be required to take the Primary Examination, but shall in the Final Examination demonstrate a general and practical knowledge of the clinical application of Anatomy and Physiology.

This special examination shall be conducted by Clinicians.

*Address all communications to:*

WARREN S. LYMAN, M.D., F.R.C.P. (C)

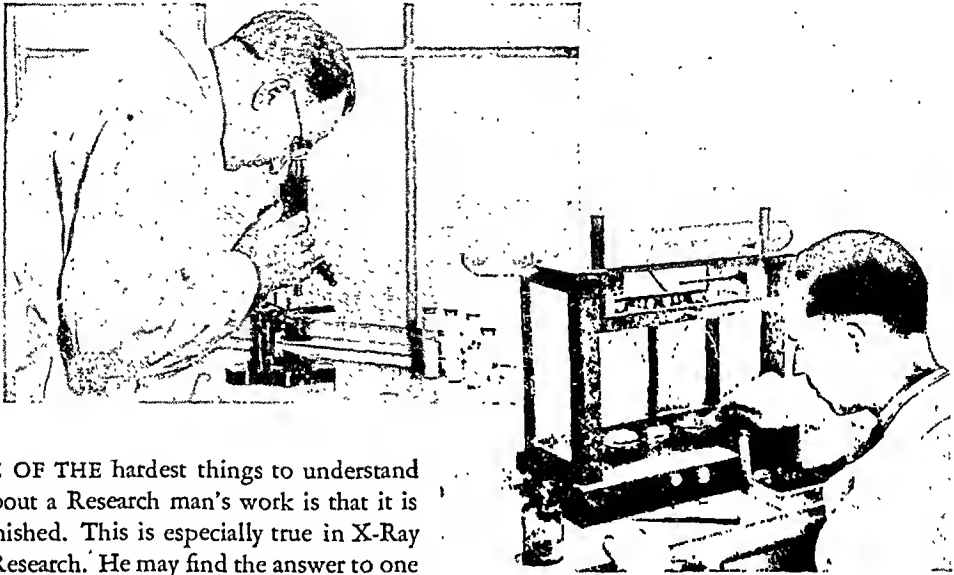
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\* American Jrl. Med. Sciences, 19S, 155 (Aug., 1939.)

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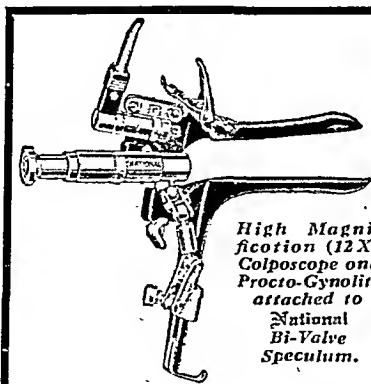
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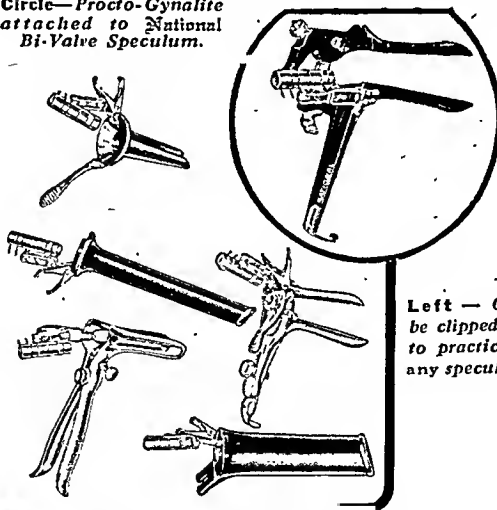
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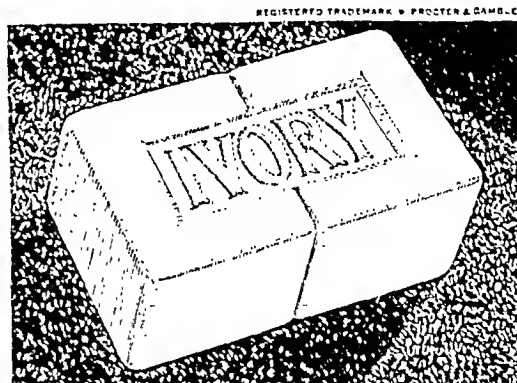
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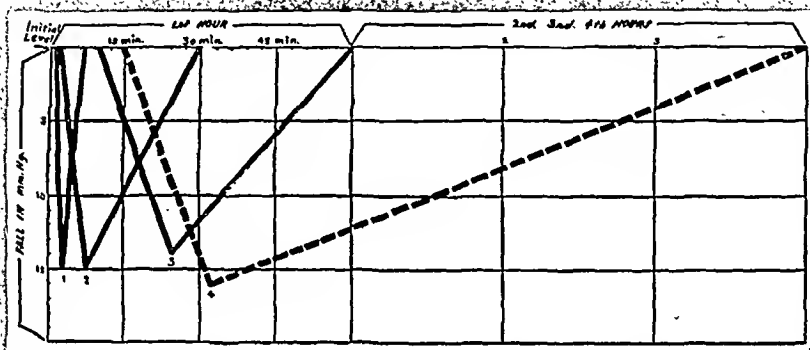


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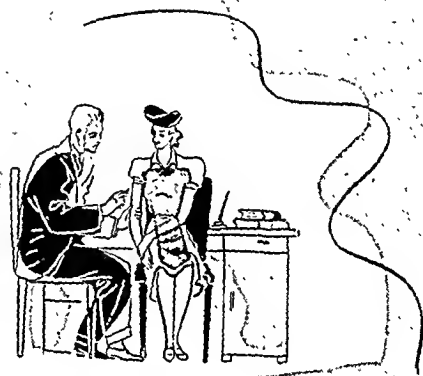
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SIR FREDERICK BANTING, K.B.E., M.C., M.D.,  
LL.D.(QU., WEST.), D.Sc.(TOR., YALE, NEW YORK), F.R.S., F.R.C.P.(LOND.),  
F.R.C.S.(ENG.), F.R.S.C., F.R.C.S.(C.),  
Professor of Medical Research in the University of Toronto, and  
Major in the Canadian Army Medical Corps

# In Memoriam

SIR FREDERICK BANTING died in Newfoundland on February 21st as the result of a flying accident. He was on his way to England in the service of the Canadian Government. Canada has lost a great citizen, the medical profession one of its most distinguished scientists, and humanity a benefactor without equal in this generation.

Frederick Grant Banting was born in Alliston, Ontario, on November 14, 1891, the son of William Thompson Banting and Margaret Grant Banting. Educated at the Alliston Public and High Schools, he entered the medical course of the University of Toronto in 1912. In 1915 he enlisted as a private but was ordered back to finish his university training. Graduating in 1916, he at once joined the Canadian Army Medical Corps. He was wounded at Cambrai in September, 1918, and was awarded the Military Cross for valorous conduct during the Cambrai engagement.

Dr. Banting served as resident surgeon in the Hospital for Sick Children, Toronto, in 1919 and 1920. He then moved to London, Ontario, and occupied the post of research assistant in the Department of Physiology of the University of Western Ontario for the session of 1920-1921.

In his Cameron Lecture in 1927 Banting described in detail the start of the investigations which led to the discovery of the internal secretion of the pancreas. This work was begun on May 16, 1921, in collaboration with the writer, who had been asked by Professor J. J. R. Macleod, Head of the Department of Physiology to participate. The memory of the intimate association with Banting during that spring, summer and autumn, when it became clear that an active diabetic principle could be prepared from degenerated or from normal pancreas, will always be cherished. The intense excitement and pleasure with which we watched the depth of colour in the sugar reagent fade as the blood sugars of the diabetic animals became reduced under the action of insulin is difficult to describe. At the beginning of the investigations the surgical aspects of the problem were entirely in Banting's hands while more chemical pro-

cedures fell to my lot. Later he taught me the essentials of surgical technique, and he acquired considerable skill in the estimations of sugar and of the other constituents in which we were interested. The animals were nursed as carefully as the somewhat limited facilities permitted, and each one was indelibly printed in our memories by virtue of some specific point which the observations on it established. We were soon completely convinced that success had been achieved and looked forward with eager anticipation to the application of our findings to the human diabetic. In those days most of our time was spent in the laboratory where we frequently slept and prepared our meals.

When Professor Macleod returned to his laboratory in the autumn of 1921 the work was continued under his general direction. Banting was given an appointment as lecturer in the Department of Pharmacology under Professor V. E. Henderson. During the following year, when he became interested in the clinical application of insulin, he was appointed senior demonstrator in the Department of Medicine under Professor Duncan Graham, a position which he held until 1923 when the Banting-Best Department of Medical Research was created and he was installed as Director. The chair was supported in part by an annual grant voted by the Legislature of the Province of Ontario. In the same year the Parliament of Canada provided Banting with a life annuity.

In the years following the discovery of insulin the whole scientific world joined to honour Banting with a galaxy of awards and medals. It will always be a source of gratification to his colleagues in the University of Toronto that they were among the first to recognize the greatness of the man. In 1922 he received the Starr Gold Medal for his M.D. thesis and the George Armstrong Peters Prize for his important contributions to surgical science. In 1923 he received the Reeve Prize which is awarded for a published report of the best scientific research accomplished in any department of the Faculty of Medicine by a junior member of the staff, and in the same year the Charles Mickle Fellow-

ship which is awarded to that member of the medical profession (anywhere) who is considered by the Council of the Faculty of Medicine of the University of Toronto to have done most during the preceding ten years to advance sound knowledge of a practical kind in medical art or science. The Nobel Prize in Medicine was awarded to Drs. Banting and Macleod in 1923. Banting immediately divided his share equally with the author, and Professor Macleod with Dr. J. B. Collip who joined our group in the autumn of 1921 and who had made several very important contributions within a short period of time.

Banting became an honorary member of most of the outstanding scientific and medical societies of the world. Awards followed each other in rapid succession: the Johns Scott Medal (Philadelphia) in 1923, the Rosenberger Gold Medal (Chicago) in 1924, the Cameron Prize (Edinburgh) in 1927, the Flavelle Medal of the Royal Society of Canada in 1931, the Apothecaries Medal (London) in 1934, and the F. N. G. Starr Gold Medal of the Canadian Medical Association in 1936.

In recognition of his great service to science and humanity Dr. Banting was created Knight Commander of the Civil Division of the Order of the British Empire in June, 1934. In the following year he was elected a Fellow of the Royal Society of London.

The exceptional mental equipment with which Banting was endowed enabled him to overcome many obstacles which would have deterred a less forceful personality. His scientific curiosity was never satisfied and his energy when he was interested in a problem knew no bounds. His training as a practical surgeon served him well on numerous occasions and he was always interested in the fundamental aspects of the problems which he attacked. His experiences during the Great War as a battalion medical officer made a lasting impression on his mind. He was never too busy to leave the laboratory in order to set a fracture or to perform a surgical operation on one of his army comrades or on some patient who was in need. His predominant thoughts, even in his last hours, would be to do his utmost to relieve the sufferings of others.

After the discovery of insulin he made a vigorous and sustained attack on the physiological problems associated with the suprarenal gland. Later he made a significant advance in our knowledge of the etiology of cancer. It will not

be possible here to describe all his contributions to medicine. He gathered around him a group of young men whose interest in research he fostered and encouraged. His laboratory made a substantial contribution to the work on silicosis. He provided a sanctuary for scientists who had been driven from their homes. He was interested in and helped every young man who appealed to him for an opportunity to investigate medical problems.

Banting had a very definite philosophy of life which he once expressed in the following words:

"It is not within the power of the properly constructed human mind to be satisfied. Progress would cease if this were the case. The greatest joy in life is to accomplish. It is the getting, not the having. It is the giving, not the keeping.

"I am a firm believer in the theory that you can do or be anything that you wish in this world, within reason, if you are prepared to make the sacrifices, think and work hard enough and long enough."

Although Sir Frederick's great energies were devoted for the most part to scientific research on medical problems, he had many other interests in which he always hoped to indulge more fully after he had retired from active work. A member of the Arts and Letters Club of Toronto, he was one of Canada's most accomplished amateur painters. His oils of Quebec scenes, of Arctic life, and of the Canadian Rockies form a valuable addition to the available artistic records of those regions.

In 1938 Banting's intuitions stimulated him to approach the military authorities in Ottawa with plans for the formation of a research organization to study the peculiar problems of aviation medicine. At the outbreak of the present war this work was under way. He was Chairman of the Associate Committee on Medical Research and of the Sub-Committee on Aviation Medicine of the National Research Council of Canada. He was also an adviser to Brigadier Gorssline, Director-General of Medical Services of the Royal Canadian Army Medical Corps. Few Canadians have played a rôle so important in Canada's war effort; none with the same self-effacing modesty. Sir Frederick died as he had lived—in the service of his country and of humanity. Our deepest sympathy goes out to Lady Banting.

C. H. BEST

# The Canadian Medical Association Journal

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No. 4

## RECENT ADVANCES IN MEDICINE—ETIOLOGY AND THERAPY\*

THE 1940 LECTURE OF THE ROYAL COLLEGE OF PHYSICIANS OF CANADA

By A. H. GORDON, M.D., F.R.C.P.(C.)†

*Montreal*

ANY one of us in looking through an anthology might wonder why some poem was included and another left out, and for the same reason some one here may wonder why under the above title certain subjects are given consideration and others are not, but if we were unanimous about everything, this world would be, as a patient once described his Lenhartz diet, "innocent but dull".

The same difference of opinion will arise about the definition of the word "recent". To a geologist I presume anything would be "recent" which occurred after the appearance of man upon the earth, while to some very modern periodicals anything which occurred last week would be hopelessly passé; and so I apologize to the bright young people and to the elder statesmen if either too much or too little is called "recent". One is also confronted with a dilemma, one horn of which is to accept as an "advance" something recent but yet untried, and the other horn is to reject some advance until it is tried so long that it is no longer recent. Guarded by these protective remarks, I may venture into my subject.

Logically etiology should precede therapy, and I wish to call your attention first to the phase of the etiology of disease which has for some years aroused much interest, and that is the group of viruses.

J. H. Mueller,<sup>1</sup> of Harvard, outlines the properties of filterable viruses with the statement that up to 1920 it was held that viruses were ultramicroscopic living organisms differing in no

essential way from bacteria. They were believed to develop by multiplication from pre-existing forms which gained access to a suitable culture medium such as the cells of a susceptible host. Later there was a tendency to consider the viruses as non-vital, enzyme-like materials, produced by cells under suitable conditions. Finally, there is a middle view which places the viruses in a category somewhat below the free living bacterial cell in complexity, in that they are deficient in some of the functions essential to growth and reproduction, and thus limited in habitat to a ready source of materials which they themselves are not capable of synthesizing. This view, however, holds that the virus is "living", in the sense that it divides when placed in a suitable environment, and that multiplication is due to its own vital force, the host's part being a passive one, and the host being a living cell.

The size of the virus element has been determined by three methods: (1) by dark field microscopy or photography with ultra-violet light; (2) by filtration through collodion membranes of graded size of pores; and (3) measurement of its rate of sedimentation during very high speed centrifugation. The filterable viruses include substances varying in size from the lower limits of visibility by the microscope down to bodies of the dimensions of molecules. The virus of psittacosis or parrot fever is at the upper level, and next to it the virus of vaccinia, and in the lower ranges comes the virus of poliomyelitis. To use illustrative similes, the virus of poliomyelitis could contain 8 hæmoglobin molecules, whereas the psittacosis virus could contain 125,000. The particules of vaccinia virus are visible as elementary bodies or Paschen bodies,

\* Delivered before the Royal College of Physicians and Surgeons of Canada, Ottawa, October 26, 1940.

† Consulting physician to the Montreal General Hospital.

after the name of the observer, and it is held that these elementary bodies bear the same relation toward infectivity as do the individual organisms in a culture of pneumococcus or anthrax bacillus.

Chemical analysis of the centrifuged and dried virus material showed that its composition was similar to that of bacterial cells.

The elementary bodies of vaccinia are agglutinated by specific immune sera just as bacteria are. Attempts to demonstrate respiration or other vital processes inherent in the elementary bodies have been completely negative. It appears, then, that the elementary body of vaccinia may be held to represent a micro-organism differing from the staphylococcus, for instance, in being smaller, and in being deficient in certain enzyme systems. In order that the virus may multiply it must find an environment in which these enzyme systems are already functioning, and then appropriate the systems, or their products, to its own use. The virus thus becomes a parasite of certain cells which lack some mechanism necessary to repel the virus invader.

Zinsser<sup>2</sup> pointed out that, as in bacterial diseases, a virus may be highly individual or widely promiscuous in the subjects of its attacks. Thus, only man can be successfully infected by the virus of herpes zoster, chicken-pox, or the original encephalitis lethargica of Von Economo; and the Rous sarcoma virus is virulent only for chickens. At the other end of the scale, rabies virus can cause fatal disease in a large variety of animals. Between the two extremes lie all degrees of infectiousness.

Poliomyelitis attacks only man and the monkey; the virus of human influenza, only man, ferrets and white mice; that for the St. Louis encephalitis, on first isolation from man, only monkeys and a special strain of inbred Swiss mice; the agent of equine encephalomyelitis is infective for man, mice, guinea pigs, rabbits, birds and mosquitoes; and the virus of yellow fever for man, monkeys, mice and mosquitoes.

A given virus when passed repeatedly through a particular species of animal may increase in virulence for this species while diminishing in virulence for other species. One example of this is the rabies virus, which when passed through rabbits assumes a high infectiousness for rabbits but diminishes in infectivity for monkeys, dogs and man. The question of virus alternation between chicken-pox and herpes

zoster is not settled, but enough cases are reported to keep the subject open (Kundrat).

The immunity to virus agents follows no law. To smallpox, poliomyelitis, yellow fever, fowl plague, hog cholera and canine distemper, immunity usually lasts for life; in dengue fever it lasts one or two years; and in herpes simplex recurrence is almost the rule.

Active immunization against virus diseases is in its infancy, but tissue cultures furnish a simple method for obtaining virus agents in larger quantity, and progress is anticipated. Zinsser stated that large scale human vaccination against poliomyelitis with virulent tissue material is dangerous, since no criteria exist for measuring the specific virulence of such preparations or for determining whether such preparations are actually killed or attenuated.

Passive immunity against virus diseases has made little headway. Kramer and Aycock<sup>3</sup> in 1932, Park<sup>4</sup> in 1932, and Fischer<sup>5</sup> in 1934, found no definite evidence of its efficacy from their statistical studies in the cases given convalescent serum for prophylaxis against poliomyelitis. In measles, the use of convalescent serum given in 5 c.c. dosage within four days of exposure will usually protect, and is of value in modifying the course of the disease if given in the pre-eruptive stage.

A virus disease which in recent years has become important to human beings is the virus of equine encephalomyelitis. Two types are described, the "eastern" type found in horse epizootics east of the Appalachian Mountains, and the "western" type, as its name implies, found in the western portions of the continent. The western type has been found to be transmitted by a mosquito, the *Aedes Egypti*, and also by wood ticks. In 1938 it was found that both types of the disease occurred in man. The eastern disease has a high mortality in man. The virus was isolated from a flock of sick pigeons observed in the region of a horse epizootic. Pheasants, ducks, wild geese and European blackbirds have also been hosts to the virus, suggesting that wild migratory birds may transfer the disease from one region to another.

Zinsser has laid stress upon the importance of insect vectors in the transmission of the virus diseases, and in 1939 Goggleshill announced the biologic transmission of lymphocytic choriomeningitis through the mosquito *Aedes Egypti*. This disease, or syndrome, described in the last few years, should be suspected in patients having

a history of a previous respiratory infection who show signs of an acute inflammatory reaction of the cerebrospinal system, and who present a lymphocytosis in a bacteria-free spinal fluid. Recovery has been the rule, occasionally with some intracranial damage. The course is from 10 days to a number of weeks. All strains of the virus are pathogenic for mice on intracerebral inoculation. Breslich, Rowe and Lehman<sup>10</sup> reported in November, 1939, 23 cases of acute epidemic encephalitis in North Dakota, where it had not been previously observed, but the serum did not agglutinate the virus of lymphocytic choriomeningitis.

The most important virus disease of man is epidemic influenza. Our later knowledge of the disease dates from 1933 when Smith, Andrewes and Laidlaw<sup>7</sup> isolated a virus from patients ill with influenza by injecting ferrets intranasally with nasopharyngeal washings from these patients. The ferrets acquired the disease and were then immune to reinfection, and their blood serum neutralized the virus.

An epidemic of swine influenza ("hog flu") had been prevalent since 1918, and Shope<sup>6</sup> in 1931 demonstrated that the disease could be transmitted by intranasal injection of bacteria-free filtrates of infected swine lung tissue, but found that a bacterial agent, *Hæmophilus influenzae suis*, was also necessary for the production of the typical epidemic disease. Smith, Andrewes and Laidlaw transferred the virus of swine influenza to ferrets and found that it produced in them a similar but more severe disease than did the human virus. Then they found that a ferret convalescent from swine influenza was immune to human influenza virus, but a ferret infected with human influenza could be reinfected with swine influenza. In no instance has the virus been transmitted by any other route than the respiratory tract. Some Russian experimenters<sup>8</sup> have infected human volunteers with a mouse lung suspension of two strains of influenza virus, by spraying it into the nose. Twenty per cent of the volunteers developed symptoms similar to the common cold.

It thus appears that tissue culture and mouse passage human influenza can produce a respiratory infection indistinguishable from influenza if the virus is injected intranasally in sufficient quantities, and these results are strong evidence that a virus is the cause of at least one group of respiratory infections which are clinically and epidemiologically epidemic influenza.

The following paragraph from an article on "Human and swine influenza" by J. B. Mote,<sup>9</sup> of Boston, is a useful summary of our present knowledge.

"We know at least some epidemics of clinical influenza are caused by related viruses, but the etiology of pandemic influenza is still an open question. Thus, in spite of our progress in the study both of influenza and other human respiratory infections, the problem in its broader sense remains unsolved; and respiratory epidemics can still intermittently incapacitate large portions of most populations, and can periodically devastate the world. In the absence of more complete and specific information concerning respiratory virus infections, it is evident that a public health effort at specific prevention in this group of disease is both premature and unwise."

Reimann and Havens,<sup>11</sup> in a group of cases of clinical influenza, failed to find the man-ferret virus, and suggest that another virus to which the ferret is not susceptible may be responsible.

#### HYPERTENSION

A very notable advance in the study of hypertension is due to Goldblatt, a Canadian graduate. The association of hypertension and nephritis was universally recognized, and Goldblatt<sup>12</sup> adopted the following working hypothesis. If organic disease of the kidney be the initiating factor in the pathogenesis of benign hypertension, then this disease is in all probability the arteriolar sclerosis which is so frequently associated with the kidney. It was demonstrated that decrease of the lumen of the renal artery by varying degrees of compression by clamps caused an immediate decrease of blood flow through the kidney. Constriction of one renal artery resulted in elevation of blood pressure, which persisted for weeks or months, but adequate constriction of both renal arteries resulted in persistent hypertension. This persistent hypertension resulted also from clamping of one renal artery, and later, removing the other kidney. This hypertension caused elevation of both systolic and diastolic pressures.

Disturbance of renal function also results from constriction of the renal arteries or of the aorta above them. A good example of this mechanism is the hypertension occurring in coarctation of the aorta.

Two possible mechanisms might bring about this pressor effect—either a nervous reflex from the ischæmic kidney, which would affect the general vasomotor apparatus, or a humoral process set up by the ischæmic kidneys, which causes constriction of the peripheral vessels. That the ischæmic kidneys are responsible is

shown by the following facts. (1) If the ischæmic kidney is removed the blood pressure falls. (2) If the clamp on the ischæmic kidney is removed the blood pressure falls also. (3) If the kidneys are clamped and the clamp is removed from one the blood pressure falls more slowly. If both clamps are removed the blood pressure falls promptly. (4) If one kidney is removed and the other is transplanted elsewhere in the body, constriction of the blood supply to the transplanted kidney results in elevated blood pressure. (5) Bilateral nephrectomy is not followed by persistent hypertension. These results indicate that the kidney is responsible for the effect, and that it must be present in the body to cause it.

Section of the splanchnic nerves and excision of the lower thoracic ganglia, or of the anterior roots from the 6th dorsal to the 2nd lumbar level, or excision of the entire sympathetic system have failed to reduce hypertension as long as the main renal arteries remain constricted. Bilateral removal of the adrenals without substitution therapy prevents the development of hypertension.

The results of all of these investigations apply generally to benign and malignant hypertension. These experiments render it highly probable that diminution of renal blood flow produces hypertension as a result of the secretion of a pressor substance into the blood by the ischæmic kidney.

Weiss and Parker<sup>13</sup> point out that pyelonephritis, by its effect upon the renal circulation, will bring about hypertension; and Herriek<sup>14</sup> states that 22 per cent of patients suffering from pyelitis in pregnancy in the Sloane Maternity Hospital, developed hypertension; and McCann and Romansky<sup>15</sup> raise the question whether ptosis of the kidneys, by producing renal ischæmia, may aggravate an existing hypertension.

The practical bearing of these facts is that the diagnosis of so-called essential hypertension in these days should take account of the possible renal factors in its production, some of which may be remediable.

Search has been made for the source of the hypothetical pressor substance presumed to be present in renal ischæmia. Goormaghtigh,<sup>38, 39</sup> of Ghent, has demonstrated at the vascular pole of the glomerulus a group of cells of special structure resembling smooth muscle. Similar cells are seen in the cutaneous myoarterial glomus and in the carotid body. These groups

of cells have been called the "juxta-glomerular apparatus". Goormaghtigh examined these areas in the artificial ischæmic kidneys of animals and found that they had increased in number and size. The possibility that these cells may have a local, or even general, secretory or humoral activity, and thus may have a direct relationship to the hypertensive principle of the ischæmic kidney must be considered.

*Sarcoid*, or *Boeck's disease* is not a recently discovered disease, but one may say that its rediscovery is recent, and Palmer<sup>16</sup> has recently given a very complete description of it. Its histological unit is a type of granuloma, and its clinical appearance may be as an x-ray film showing extensive pulmonary disease in a patient who is in good health; it may appear in the eye as a uveitis with parotid swelling; on the skin as an apparent lupus; in the hands, as distorted fingers with cystic areas in the phalanges by x-ray; and in the bowel as the so-called regional ileitis. It is a veritable man-trap for even the most observant clinician.

Though the subject of *congenital lung cysts* has had vague recognition as a clinical curiosity for years, Adamson's<sup>17</sup> article in 1936 brought it forward as a practical problem in thoracic diagnosis. He points out that lung cysts may simulate chronic bilateral pneumothorax, pleural effusion, or diaphragmatic hernia. He reported four cases and reviewed the literature, and found that lung cysts were twice as common in males as in females, and were commonest in the early ages, and that dyspnoea, cough and cyanosis were the commonest symptoms. He pointed out also that pulmonary cysts were fundamentally due to congenital defects, and were commonly associated with other congenital anomalies, and were common in supernumerary lobes. The cysts may be filled with mucus, and these probably develop from buds pinched off from the developing trachea. Most of the cysts, however, are filled with air. Ross and Fullerton<sup>18</sup> comment upon the association between spontaneous pneumothorax and the presence of other congenital anomalies, which suggests the possibility of the spontaneous pneumothorax having a basic congenital origin.

*Occidental beri beri* with cardiovascular manifestations is the name given by Soma Weiss<sup>19</sup> to the type of heart found in B<sub>1</sub> deficiency. He says that alcohol is, in the west, the chief cause of beri beri, while in the east it is due to polished rice. The cardiovascular symptoms are



closely associated with thiamin deficiency. The evidence is that in such cases (a) there is thiamin deficiency in the diet, and (b) decreased thiamin content in the urine; (c) there is improvement following thiamin administration, and (d) production of electrocardiographic changes in healthy men on diet lacking only thiamin chloride; (e) induction of cardiac disturbances in animals on a thiamin deficient diet, and (f) disappearance of the experimentally induced cardiovascular disturbance after the use of thiamin chloride.

*Kaschin-Beck's disease.*—An interesting report has been made by Hiyeda<sup>20</sup> of an endemic disease in the Trans-Baikal region and in northern Korea in the mountainous regions among primitive tribes. In build the patients are short, with shortening of the long bones. The shortening is always proportionate, and there is also deformity of the joints. There are attacks of arthritis in the large and small joints in spring and autumn. The disease is active during the growth period from 10 to 18 years of age. It later becomes inactive. X-rays show atrophy of bones, destruction and resorption of joint surfaces, and premature synostosis of the joint cartilages. The disease is not hereditary, and children removed from the area do not contract it. Hiyeda found that the wells in the region contained from 0.6 to 1.0 mg. iron per litre. The blood of healthy Japanese in Manchuria contained 62 mg. of iron per 100 c.c., while blood of patients with the disease contained 70 to 100 mg. per 100 c.c. At necropsy the cortex of the bones was thinned, and the medullary canal dilated, and there was irregular osteogenesis of the epiphysis. Iron pigment was deposited in all the organs. It has been suggested that if these observations are confirmed there may be an upper limit to the medical benefits of iron.

Of considerable interest are the observations of F. G. Young,<sup>21</sup> that by a series of injections of anterior pituitary extract of increasing strength he was able to produce first glycosuria, from which recovery took place, but ultimately a diabetes which persisted after the injections were discontinued. When this stage was reached, he found hydropic degeneration of the islets of Langerhans, similar to that described by Opie 40 years ago in fatal human diabetes, and by Allen in dogs rendered diabetic by partial pancreatectomy. Yet all trace of the causative

extract had vanished "as though a storm had passed over the Islands".

A new attitude toward an old disease is reflected in a summary in the *Brit. M. J.* of March 9, 1940, in which it was stated that in England in the week ending February 24, 1940, 586 cases of cerebrospinal fever were reported, which was more than a year's total for 1937, and more than 40 per cent of the year's total for 1928. The unfavourable weather had kept people indoors, and tended toward crowding. The changed attitude was shown first in discouraging the view that carriers and contacts were dangerous people, and, second, in the well-grounded confidence in the ability to cure the disease in a great majority of cases. The Ministry of Health discouraged the search for carriers as a routine practice, believing that a person with a positive swab today may have a negative one tomorrow. Moreover, group 2 meningococcus, the type commonly carried in the pharynx, is usually avirulent. The control of the disease is not a matter of the pursuit of carriers, but of providing three feet of space between beds in sleeping quarters, and of providing good ventilation. Batches of recruits or school children should be kept together, without frequent addition of new entrants to the groups. Local treatment of the pharynx is probably useless. The use of sulphonamide drugs as a preventative is to be discouraged as it prevents effective treatment if the person contracts the disease.

#### THERAPY

In this year of grace one's mind leaps to chemotherapy and from chemotherapy to the sulphonamide group of drugs. But we must recall that chemotherapy in the forms of mercury, iodine, arsenic, and bismuth has long been employed for syphilis; quinine has been employed for malaria; antimony for bilharzia infections and kala azar. And we all have in mind the careful and valuable work of MacLachlan and his associates on the quinine derivatives, and especially on hydroxyethylapoeupreine in pneumonia up to 1937, when sulfanilamide came so dramatically to the fore.

Many look upon the discovery of the antibacterial effects of prontosil as the greatest therapeutic discovery in modern medicine. This took place in 1933. In 1935 Domagk stated that prontosil, a relatively non-toxic red dye, given by mouth to mice inoculated with fatal doses of



hæmolytic streptococci, saved 100 per cent of the animals, but *in vitro* it had no bactericidal effect. For this work he received the Nobel prize. In 1935 an allied product was used in France with favourable effects in erysipelas, and in 1936 Colebrook and Kenny and Buttle in England reported favourable clinical and laboratory results in hæmolytic streptococcus infections. The work was taken up on this side of the water in 1936. In 1938 Whitby, working with the new preparation, aminobenzene sulphamidopyridine (now called sulfapyridine) on mice inoculated with pneumococci and with hæmolytic streptococci found that it appeared to exert a definite action on the capsule of the pneumococcus and that it was as active as sulfanilamide against hæmolytic streptococci and meningococci, and that it had a low toxicity for animals and did not produce porphyrinuria in those tested. Whitby's work in particular stimulated the adoption and study of the newer drug on this continent. Marshall in pharmacology and Long and his associates in clinical research have greatly clarified our views of this whole group of drugs.

Evans and Gaisford, of Birmingham, England, in *The Lancet*, July 2, 1938, reported a series of 100 cases of pneumonia in the Dudley Road Hospital, Birmingham, treated by the new drug—M.B. 693, named sulfapyridine—in which there was a mortality of 8 per cent as compared with an equal number treated by their colleagues with the routine non-specific methods with a mortality of 27 per cent. It was historic that the group with the mortality of 27 per cent was a composite picture of the old mortalities, and it was prophetic that the 8 per cent mortality under the new drug was identical with the results from its employment the world over, since that time.

Absorption of these drugs is rapid when taken by mouth, and it is largely from the small bowel. The drugs are very diffusible, and concentration in the spinal fluid is almost equal to that in the blood. Though 20 to 40 per cent is acetylated this has little effect upon the drug's efficiency. Given in divided doses daily, concentration is maximum in two days. For the treatment of severe infection a concentration of 10 mg. per 100 c.c. or dosage of 1 gram per 20 lb. of body weight is necessary. Children require 50 per cent more, and infants three times as much as the mg. per kg. dose for adults. Depression, headache and dizziness may occur, and nausea

and vomiting are very common, making the patient feel of all men most miserable and causing him to wish he were dead.

Agranulocytosis and hæmolytic jaundice are rare but grave complications, and demand cessation of the drugs, as does the appearance of a skin rash. Fever, usually in the form of a sharp rise after a week's treatment, is another cause for cessation.

Marriott<sup>22</sup> thinks that sulfapyridine is equal or slightly superior to sulfanilamide against the hæmolytic streptococcus, meningococcus, Friedländer's bacillus, *Clostridium welchii*, and *Esch. coli*. It is the most effective drug against the gonococcus, and least effective against the staphylococcus aureus and *Strep. viridans*. It may be of value against *B. typhosus*, *B. pestis* and *B. influenzae*. At present it is the drug of choice for any form of fever of uncertain causation which is probably due to bacterial infection.

Kelson and White<sup>23</sup> have reported three cases of *Strep. viridans* subacute bacterial endocarditis, each having at least four positive blood cultures, which were treated by sulfapyridine and heparin. All showed improvement, and at the time of reporting had been free from evidence of the infection for four, eighteen, and nineteen weeks respectively. They state that this method had given more promise than any previously employed against this disease. In Montreal we have found that whereas the method showed promise for a time and the blood became sterile, the disease later went on to a fatal issue.

Swain,<sup>24</sup> of St. Bartholomew's Hospital, says that, since the *Strep. viridans* is not a single species but a heterogeneous group, there is room for variation in its responses to drugs.

The treatment of cerebrospinal fever according to the *Brit. M. J.* of March 9, 1940, is a medical emergency. When suspected on clinical grounds, a full dose of sulfapyridine should be given while awaiting laboratory confirmation. Following this, nine gm. a day for 2½ days, and for another five days the dose should gradually be reduced to zero. In fulminating cases the first two doses should be given intravenously and intramuscularly, one gm. each of the sodium salt. If swallowing is impossible, the drug should be given by the nasal tube. Two to three litres of fluid should be given by mouth or vein. If vomiting persists the drug should be changed to sulfanilamide. There is no clinical evidence of the value of serum when combined with a high dosage of sulfapyridine. There is

little to be said for intrathecal serum and the drug should never be given by this route.

In an epidemic of cerebrospinal fever in Shanghai the cases reported by Jordan, Blake-lock and Johnston<sup>26</sup> were divided for treatment into four groups, and the results were

1. With intrathecal serum only—recoveries, 62 per cent.
2. Sulfapyridine alone—recoveries, 68 per cent.
3. Serum intrathecally and sulfapyridine—recoveries, 73 per cent.
4. Intravenous and intramuscular serum with sulfapyridine—recoveries, 80 per cent.

Relapses were rare following sulfapyridine and frequent following serum.

It is interesting that Gross and Cooper<sup>10</sup> found the combination of sulfanilamide and an anti-serum intraperitoneally more effective in the pneumococcus meningitis of rats than either alone.

*Sulfathiazole* is the thiazole analogue of sulfapyridine. Spink and Hansen<sup>27</sup> report upon its use in 128 cases of various infections. In 33 cases of pneumonia it was as effective as sulfapyridine, though the fall in temperature was less abrupt. Fifteen consecutive cases of staphylococcus septicæmia recovered. If these figures are confirmed, it is certainly a chemotherapeutic triumph.

Its use in urinary infections from staphylococcus, *B. proteus*, and hæmolytic streptococcus was very satisfactory. It was readily absorbed and quickly excreted. There was less nausea than with sulfapyridine, but fever and rashes were more frequent. A greater tendency toward blockage of the renal tubules by crystals had been noted.

Finland, Lowell and Strauss<sup>31</sup> gave recently an excellent summary of the present status of pneumonia therapy. They remark on the almost acrobatic celerity with which one development in the treatment of pneumonia has pressed on the heels of another in the following order: Horse serum types I and 2; Felton's refined serum; the break-up of type 4 into thirty odd types; special sera for many of these; simplified Neufeld typing; rabbit serum; sulfanilamide; sulfapyridine and sulfathiazole.

Their conclusions are: (1) For most cases of pneumococcus pneumonia specific sera and sulfapyridine are about equally effective when used separately. (2) For most of the cases with the worst prognosis, the combination of serum and sulfapyridine is more effective than either alone. (3) The best effects of combined therapy in the

severest cases are realized only if serum administration is not delayed more than 12 hours after drug therapy is started. (4) Cases in which combined therapy is more effective than drug or serum alone include: (a) Bacteriæmic cases over 50 years old, or when treatment was begun late, or when the blood yielded large numbers of pneumococci. (b) Cases with more than one lung involved, or patients over 60 who have moderate or severe infections; or in severe cases of type II or III or V of pneumococcus infection; and also when there is evidence of damage by the drug to the red or white cells; when rashes have occurred from the same drug; when jaundice appears; when there is renal impairment; when patients cannot tolerate the drugs well; and finally when, after 24 or 36 hours of active chemotherapy, the drug fails to bring clinical improvement.

It is highly necessary for typing to be done before sulfapyridine has been administered and to have serum available.

Sulfathiazole has shown a potency against the pneumococcus equal to sulfapyridine. It is more soluble—5 g. can be dissolved in a litre of 5 per cent glucose at 90 to 100° C. Nausea and vomiting occur in less than 50 per cent as compared with 66 per cent with sulfapyridine, but drug fever and drug rashes are more common, and crystals in the urine are more frequent.

Two other forms of chemotherapy have reappeared recently. One is the method of rapid treatment of syphilis by the continuous drip method, giving 1 gram of arsphenamine daily in 1,500 c.c. of 5 per cent glucose into the vein at the rate of 30 drops per minute. This procedure is repeated daily for 4 or 5 days, giving in that time the amount of drug usually given in three months. This was carried out at Mount Sinai Hospital by Hyman, Chargin and Liefer<sup>28</sup> five years ago, and the results have recently been published. At the end of the 5-year period 86.6 per cent were well and sero-negative. Polyneuritis occurred in 33 per cent, fever in 60 per cent, toxic rashes in 50 per cent, jaundice (slight) in 6 per cent. One death occurred during treatment, preceded by convulsions; and 14 per cent were failures. A new series of 100 cases has been treated with mepharsen which has proved less toxic, but it is too early to judge the results.

The other chemotherapeutic effort is that with gold salts for rheumatoid arthritis. Many will recall the use of sanocrysin (a gold salt) in

tuberculosis, and its later eclipse. Dawson and Hobby<sup>29</sup> working with mice, found that auro sodium thiomalate—a gold salt, in a single dose of 2 mg. subcutaneously—protected the majority of animals infected with 1,000 lethal doses of a culture of hæmolytic streptococcus (strain C 203 MV). The acute toxic dose of the gold salt is 10 times the effective therapeutic dose.

Hartfell, Garland and Goldie<sup>30</sup> treated 900 cases of rheumatoid disease with gold thiosulphate in doses of 25 to 50 mg. intramuscularly, with a maximum total dose of 1 g.; 42 per cent of these cases showed some toxic reaction, such as skin rashes, stomatitis, albuminuria, hepatitis, aplastic anæmia, and agranulocytosis. Reports from various sources, of improvement in the cases of rheumatoid arthritis, range from 45 to 80 per cent and this includes a drop in the sedimentation rate.

Since agranulocytosis is a hazard in the course of chemotherapy, it is of interest that Jackson and Tighe<sup>32</sup> have recently reported a further group of cases of agranulocytosis, making a total of 85 in all, treated by intramuscular injections of pentose nucleotide, 10 c.c. 4 times a day, with a mortality of 35 per cent, while 75 cases with no specific therapy had a mortality of 78 per cent. Dameshek has doubts of the potency of the specific therapy.

#### VITAMINS

As we approach this subject we get a whiff of the odour of sanctity and a peep within the veil at what the world has come to think is the mystery of mysteries. Red flannel and goose grease had their day before focal infection was king but now B<sub>1</sub> reigns in his stead. But in spite of the pandemic hysteria about vitamins and the tens of millions of dollars misspent upon them by the public, there are definite values in the same public's recognition that it cannot live on quantity alone, nor upon quantity plus calories alone, and after this fitful fever they shall eat well.

The naming of the vitamins has been simplified—in particular the subgroups of vitamin B—and now we recognize the antineuritic, or beri beri preventive fraction as B<sub>1</sub>, which has been synthesized as thiamin.

The pellagra preventive or P.P. factor, synthesized as nicotinic acid; the fraction formerly known as vitamin B<sub>2</sub> and vitamin G, has been called riboflavin, while B<sub>6</sub> has also been synthesized under its own name and that of pyri-

doxin. Spies and his associates<sup>33</sup> describe a syndrome of extreme nervousness, insomnia, irritability, abdominal pain and difficulty in walking which disappeared after administration of 30 mg. of B<sub>6</sub>. Following this, a group of people on adequate diets and another group with clinical evidence of pellagra, beri beri, riboflavin deficiency, and B<sub>6</sub> deficiency were all given 30 mg. of B<sub>6</sub> (pyridoxin). The normal patients excreted in the urine an average of 7.9 mg. of vitamin B<sub>6</sub>, while the deficiency group excreted an average of 0.5 mg. Three patients hospitalized and fed a diet deficient in B<sub>6</sub> for three weeks excreted almost none. These results suggest that vitamin B<sub>6</sub> is important in human nutrition, and support the view that clinical deficiency diseases occur, not as single entities, but as complexities.

On account of its phenomenal success in the treatment of hæmorrhagic disease of the newborn, vitamin K has become almost a household word.<sup>41, 42, 43</sup> Its discovery by Dam in 1929; its efficacy in shortening the prothrombin time in infants, and in adults who suffer from liver damage; its synthesis as a naphtho-quinone derivative which may be given hypodermically in a dosage of 1 mg. per day; and the wide gap between its therapeutic and toxic dose have made it a potent instrument in the therapeutic armament.

In the treatment of Addison's disease there have been several advances in recent years. First the recognition of the abnormal electrolyte metabolism and the attempt at its correction by high sodium and diminished potassium intake. Second, the preparation of an active cortical adrenal extract which was life-sustaining. And third,<sup>34</sup> the synthetic preparation of desoxycorticosterone as a readily available hormone substitute. And, finally, the method of subcutaneous implantation by Thorn.<sup>35</sup> The dose averaged 25 mg. daily for 4 days; then 10 to 25 mg. daily for 5 days more, with standard caloric and water intake. The results were retention of salt and water with tendency to œdema and serous effusion; decrease in salt and water output; increase in body fluid and in blood volume; decrease in serum and non-protein nitrogen; and elevation of blood pressure. It was later found that patients did best with small daily doses of the synthetic hormone without addition of salt beyond that in the food.

Thorn and Firor<sup>35</sup> suggest that it is possible to maintain some patients in fair health by

means of sodium chloride therapy alone, but a return to normal activity on this regimen is unlikely. Five mg. desoxycorticosterone in oil daily is a maintenance dose. Thorn formulated the idea of implanting in the subscapular fatty tissue a pellet of 100 to 150 mg. which maintained the patient for a year. Cleghorn, Fowler and Wenzel,<sup>36</sup> of Toronto, report the successful treatment of 9 cases of Addison's disease by desoxycorticosterone, but point out that there is evidence that it is not a complete replacement for cortin.

The second example of a synthetic hormone is stilbæsterol which was produced by Dodds in 1938 under the name of diethyl stilbæsterol. Me-Bryde and others<sup>37</sup> employed it in 36 cases of eunuchoid or menopausal affections in women. There were marked changes in the vaginal smears and subjective improvement. Sixteen per cent had unpleasant effects, chiefly nausea and vomiting, but only two were forced to discontinue the drug. No changes in liver function nor abnormalities in blood or urine appeared. The dose ranged from 1 mg. to 5 mg. daily by mouth. It is approximately as potent as œstrone intramuscularly, and one-third to one-half as potent as œstradiol benzoate.

Of all the advances in medicine in recent years probably the most striking is the change, glacier-like in its imperceptible but powerful movement, away from the segregation of the ills of a patient in individual organs toward the recognition that his ailments are a part of himself, that the man is a part of all that he has met, and that his illness demands that we should, in the words of Cauby Robinson, "treat the patient as a person".

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## RÉSUMÉ

On commence à mieux connaître les virus, leurs dimensions, leur composition chimique, leurs affinités antigéniques, leur électionisme dans le choix de leur hôte, les conditions de leur virulence, les bizarreries de leur alternance, leur pouvoir immunisant ou leur impuissance à immuniser et leur mode de transmission. Le mécanisme de l'hypertension artérielle est aussi mieux connu. Le

rein ischémique détermine un réflexe hypertenseur ou déclenche un processus humoral également hypertenseur. Les opérations sur le sympathique ne résolvent pas l'hypertension mais la surrénalectomie non compensée par une médication substitutive prévient l'hypertension. Des recherches sont en cours pour isoler le facteur "presseur" hypothétique. Le sarcoïde ou maladie de Boeck est histologiquement un granulôme. Le bérébéri occidental avec troubles cardio-vasculaires est une carence de la vitamine B<sub>1</sub>. Le Kaschin est dû à un pourcentage trop élevé du fer sanguin. L'injection d'extrait d'anté-hypophyse peut causer le diabète. Au point de vue thérapeutique, les succès de la sulfanilamide et de la sulfapyridine dans certaines streptococcies dans les méningococcies et les pneumococcies sont bien connus. Le gono-

coque est mortellement frappé par cette chimiothérapie. L'endocardite maligne bénéficierait de l'association sulfapyridine-héparine. Le sulfathiazole est particulièrement efficace dans les staphylococcies et les pneumococcies. On traite maintenant la syphilis par l'injection continue de Mapharsen très dilué en 4 ou 5 jours. Le rhumatisme chronique déformant bénéficie de l'emploi des sels d'or. L'agranulocytose est heureusement influencée par les injections de pentonucléotide. La vitaminithérapie a fait des acquisitions définitives dans le groupe B complexe et K. L'hormone cortico-surrénalienne, naturelle et synthétique, a changé le pronostic de la maladie d'Addison. Le stilbœstrol serait aussi actif que l'œstrone. En résumé, on commence à tariter le malade comme une personne. JEAN SAUCIER

## WAR WOUNDS\*

THE 1940 LECTURE OF THE ROYAL COLLEGE OF SURGEONS OF CANADA

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TO those surgeons whose fortune it has been to serve their country in time of war no question can compare in importance with the progress that may have been made in the treatment of wounds. It seems fitting, therefore, that at this moment, when the first casualties in this new and dreadful war are occurring in our army, this Royal College should review what it has learned in the past and consider what progress can be made in the future.

To attempt to review the whole subject of war wounds in the time allotted to such a lecture would be both futile and dull. The wounds of the brain, the thorax, and the abdomen each call for special study, and each should be dealt with by experts in those particular fields. I shall confine myself, therefore, to general principles that might be applied to most wounds and to the application of these principles to those regions with which I have had the greatest experience.

If you were to ask me what was the greatest single contribution made in the Great War to the treatment of wounds, I would say without hesitation, the "Thomas splint". In the early months the mortality among our troops from shock and sepsis in compound fractures of the femur was appalling, reaching as high as 80 per cent. With the introduction of the splint, and particularly with the introduction of its use in field dressing stations and on the actual field of battle, this gradually fell, until by 1918 some records were as low as 8 per cent. It would, of course, be most misleading to attribute the whole

of this improvement to the immobilization and the traction provided by the splint, for many other helpful measures were used as well. Nevertheless, the change brought about by the splint was miraculous, as those can testify who were able to compare the convoys coming into the base hospitals in 1918, with those of three years before.

The great virtue of this splint and of the various modifications of it for both lower and upper extremities was that it provided good immobilization of the fracture, combined with fixed traction which allowed the handling and transportation of the patient without additional pain, shock, or damage to the limb. I draw your attention to it now because in peace time its use has become less general. Its great value, however, has been recognized by the American Red Cross and the St. John's Ambulance Association here in Canada, which have placed it in the equipment of the first-aid stations scattered along all the main motor roads and have included instruction in its application and use in their first-aid manuals.

Of the surgical measures introduced in the great war all will agree the most important was "débridement". With its general adoption came a great reduction in ordinary pyogenic infection and in gas gangrene and tetanus. The general principle involved has been retained in civilian practice and will certainly play an important part in the treatment of the wounds in this war. Success for the method depends on two main factors; first, the time elapsing between the reception of the

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wound and the operation, and, second, the skill of the operator. In order that there may be reasonable hope of preventing infection in the contaminated wound the débridement must be done within six hours of the injury and preferably within four. This was difficult of accomplishment in 1914, but in the present bombing of the cities of Great Britain it is probably quite possible to have the wounded in hospital and operated upon within an hour or two at the latest. This was so in Barcelona and may account in part for the remarkable results obtained there. In the early stages of the bombing attacks on the Catalonian cities elaborate systems of first aid were established but it was soon recognized that minor first aid was not of the importance that had been supposed, but that major measures such as the immediate transfusion of blood for hæmorrhage and shock, the débridement of the wounds, and the ensuring of complete immobilization were necessary if lives were to be saved. The first-aid posts were accordingly abolished and a huge ambulance service established for the immediate transportation of the wounded to hospital.

The skill of the surgeon is of prime importance in the surgery of war, and nowhere is it of such great importance as in the first treatment of the wounded. For the preservation of our soldiers, therefore, we should place in our casualty clearing stations or whatever units correspond to them now in England our brightest, most energetic, and best trained young surgeons, for upon them depend more than on anyone the lives of our wounded. The surgeon must show judgment in selecting for extensive operation those who have a fair chance of recovery, staying his hand in those that must die. He must be capable of both speed and yet meticulous care in excising the edges of the wound, all devitalized muscle, all dirt, all particles of clothing, all bits of loose bone and the projectile, but preserving the main vessels, the nerves and the skin. I am convinced that if this operation is well done the reward will be a great reduction in mortality, and morbidity from tetanus, gas gangrene and pyogenic infection, whereas if it is unskillfully or carelessly carried out it is quite useless.

Throughout the whole of the war of 1914 much study was devoted to the treatment of wounds with antiseptics. Old Army Medical

Corps officers will recall the temporary enthusiasms that were aroused by acriflavine, dichloramine T, and sodium hypochlorite, and they will recall that now they are practically unknown in our civilian hospitals. This total lack of interest in them is pretty conclusive proof that they were not of much value.

There were things about them, however, which in the light of modern views, were interesting. For example, I have always believed that there was some slight virtue in B.I.P.P. At first it was thought that by smearing a fresh wound with B.I.P.P. the antiseptic action of the preparation prevented infection. This, of course, is wrong, for B.I.P.P. has practically no antiseptic action. Neither does it appear to have any action on the tissues that could raise their resistance to bacterial invasion. The chances are that whatever virtue it has comes from covering the tissues with an oily film which protects them and provides more thorough drainage of contaminated areas. Certainly, some eminent surgeons think it useful, among whom are Gurd, of Montreal, and Shenstone, of Toronto, and they continue to use it in civilian practice.

The last and best effort to combat actual infection with antiseptics was made by Carrel and Dakin. There is no doubt at all that septic wounds treated by their method, by a trained staff of officers and nurses who omit no details in technique, do well. I doubt that it is the action of the antiseptic solution, however, but rather the aid that the irrigation gives to drainage, that helps the patient. The difficulty with the method was that except in a few experimental stations the details of the method were quite beyond the capability of the personnel and the results were no better than with any other plan of treatment. Except in one or two places, chief of which is the steel plant at Pittsburg, under the surgical direction of Dr. Wm. O'Neill Sherman, the Carrel-Dakin method is not used.

A method which originated in the Canadian Army and came under my observation at its early stage was the so-called "tidal irrigator method" of Taylor. The special apparatus, of which I have a sample here, was known as "Taylor's Tank". The idea of this method was to convert open septic wounds into what were the equivalent of closed wounds, and to submit them alternately to distension with an anti-

septic solution and to negative pressure by syphon. The apparatus is most ingenious, and it always appealed to me as a better aid to washing wounds than any I had seen. If some minor defects in construction have been overcome it will be heard from in this war. I have no notion that any good can come from using antiseptics, but the alternating of positive and negative pressure in the wound may aid in drainage.

One suggestion that at first seemed hopeful was that of Sir Almroth Wright, that the bathing of wounds with hypertonic salt solution might increase the outflow of lymph and so increase the natural defences against the infection. Experience, however, showed that while the discharges from the wound were definitely increased there was little if any effect on the infection. The method is no longer used.

Looking back on the experiences of the last war it would seem that the greatest need is for methods of preventing or of minimizing infection, and, if this cannot be accomplished, of combating it effectively during the first few days. It is because of this that we who were in the Canadian Army Medical Corps in 1918 leap to attention at the suggestion that we are on the verge of discoveries in chemotherapy that will make serious infection of wounds impossible. The suggestion that sulfanilamide or some such compound administered by mouth or by vein, as soon as a wound is received, may so raise the bacteriostatic properties of the blood and lymph that the natural protective agents will be able to destroy the bacteria is so attractive that it demands immediate investigation. I hope that the outbreak of the aerial war in England will lead at once to the establishment of experimental stations where these suggestions can be studied quickly and thoroughly. It should be possible, if a decision in these matters is turned over to men specially trained in the experimental method and who are specially qualified to choose that which is good from that which is indifferent or poor, to establish general policies in treatment and so give our men at the earliest moment the benefit of all that is new.

There is the suggestion also that the immediate introduction of these compounds into the wound may head off infection. A few papers have already appeared, reporting small series of cases, which seem to indicate that under certain

conditions the introduction of sulfanilamide powder or a concentrated solution will control bacteria introduced into experimental wounds. If this is so there are all sorts of possibilities, particularly in a war where the wounded can get immediate attention. It is not sufficient that opinion should be based on small groups of patients but in an experimental station it should be possible to take a hundred cases with sulfanilamide alongside a hundred others without it and quickly come to a definite conclusion. It may be that the combination of early débridement with the local application of sulfanilamide, plus its administration by mouth, will be the answer to our prayer for a preventive of infection in wounds.

The question of the time at which infection occurs in contaminated wounds has some points of interest. In the last war one of the most destructive organisms was the *S. hæmolyticus*. Yet it has been stated that cultures taken from war wounds soon after they were inflicted rarely show such streptococci. It is now maintained by Dr. Ronald Hare that such organisms rarely are in the wounds at first and that they cannot be found on the projectiles or clothing of the wounded man. It is suggested that the infection of the wound with pathogenic streptococci occurs later, from virulent organisms sprayed into the air from the throats of doctors, nurses, and other patients, or from other infected wounds. I cannot go into all the experimental evidence that has been advanced to support these ideas, but I must say that it is sufficient to make me think it may be true. Certainly, the technique of wound dressing as it has been carried out in our general civilian hospitals and in the military hospitals in the last war is such as to fill a real bacteriologist with horror. Fortunately, the old dressing tray and ward dressing wagon with its jars of gauze into which everybody dipped, tubes of packing from which strips were cut first for one patient and then for the next, and so on, has been replaced by individual dressing sets, straight from the sterilizer. Let me suggest that those of us who have not recently noted the technique of dressings on our wards do so now, in the light of modern views on the importance of air-borne infection by streptococci.

Interesting as are these and other new plans of treatment, however, they fade into insignificance beside the revolutionary ideas that have come from Barcelona. As a result of these it



would seem that almost everything we have learned about wounds since the days of Lister is about to be abandoned. As the war of 1914 came to be described as "the War of the Thomas Splint", so this one is already being called "the War of Plaster of Paris".

My attention was first drawn to the matter by a communication from Dr. Rudolph Matas, of New Orleans, who spent two months in Barcelona at the end of 1938 while the conflict between the loyalists and nationalist armies was at its height. In his letter he says:

"Let me state from the outset that whatever preconceived notions I had of the treatment of wounds, derived chiefly from the experience of the World War, were completely upset by what I saw in the Catalonian war zone. . . . The fractures of the femur, all compound, often multiple and comminuted, with great lacerations of the soft parts, commanded special attention, not only because of their gravity but as tests of the efficiency of the revolutionary methods of treatment adopted in the Catalonian hospitals in which antiseptics were totally discarded. The Carrel-Dakin treatment had been tried unsuccessfully and abandoned early in the war. With the great crowding of the wounded and inadequate trained help, the method, lacking rigorous application, had proved ineffective, especially since the simplified technique of the occlusive gypsum dressing introduced by Trueta at the Catalonia Hospital, based on the American practice of Winnett Orr, enormously simplified the care of the wounded and yielded better results. The only relic of the World War that remained was the débridement, which was the initial procedure in all cases after hæmorrhage and shock had been attended to. The greatest stress was laid on the excision of all dead, dying, or doubtful tissue, and the reduction and setting of the fractures under the fluoroscopic screen and radiographic control, while the limb was kept in complete extension. Much emphasis was laid on the thorough opening up of the wound and the making of suitable incisions in layers of fascia so as to prevent all possible retention of wound secretions. The wound was then packed with plain sterile gauze or with gauze soaked in vaseline, and finally the limb was immobilized in a skin-fitting plaster spica. The plaster was applied in sheets of gauze wrung out of a plaster cream, not a roller bandage, and placed in direct contact with the skin and wound without any interposed stockinette or padding of any sort. By this procedure the plaster received the discharges from the wound directly and soon became soaked with them and, as everyone knows who has had experience with the Orr treatment, exceedingly foul smelling. In spite of this, however, the plasters were not split or fenestrated or finally removed till three or four weeks had elapsed. Then, after washing off the mush of decomposing pus, sweat, and other matter with soap and water and removing the packs, the wound was found to be quite without signs of inflammation and covered with firm, healthy granulations. This, coupled with the highly satisfactory condition of the patient—no fever, no pain, clean tongue, good appetite—was a revelation which I had not anticipated."

Now, gentlemen, what can all this mean? Is it possible that for all the years of our surgical experience we have been on the wrong track and literally doing our patients harm by unwisely interfering with their wounds? Is it really possible that by our frequent dressings we have been introducing pathogenic bacteria where

none existed, or that we have been preventing natural defences from destroying organisms that were introduced by the projectile? Orr and Trueta think that the débridement gets rid of the risk of tetanus and gas-gangrene by removing dead tissue and letting in the air, and that the thorough drainage of the wound, along with the total immobilization of the part, allows the natural defences to act. The complete covering of the wound with plaster for three or four weeks prevents the introduction of new bacteria and, as Hare has pointed out, may account for the absence of streptococcal infection.

Well, gentlemen, much as I hope that all the claims of Trueta will prove true, I have misgivings that we must not expect too much. There is something about the appearance of the photographs of the plasters that makes me wonder if the results can be just as perfect as the published records seem to suggest. Is it possible that the standards set by these Catalonian surgeons for perfection of results are not so high as ours? I cannot help remembering 500 cases of compound fracture of the femur that passed through my hands on the way home from Rouen and Wimereux, all walking in Thomas calipers, with straight united bones, with not more than an inch of shortening and with good knees and hips, and I for one am not for throwing into the discard methods which produced such results as this without at least an enquiry. Certainly I do not believe for a minute that any skin-fitting plaster applied with the limb drawn out to full length will hold the bones in that position long after the traction is removed. And when it comes to letting these cases up on crutches two weeks after the injury, it seems to me to be sheer nonsense.

On the other hand, I must state that much of what Winnett Orr has said in the past about the occlusive treatment of wounds has been thoroughly proved by experience. The change, for instance, that he has made in the treatment of chronic osteomyelitis is nothing short of phenomenal. Before his papers appeared the common practice was to saucerize the cavities, pack with gauze, and a few days later pull this gauze out with great agony to the patient. The performance was repeated daily, with or without the irrigation of the wound with antiseptics. With the Orr method, on the contrary, the



wound is filled with vaselined gauze and is covered with plaster and not touched again for several weeks, until, indeed, the smell is so bad that something has to be done about it. When the dressing is finally changed the wound is usually found perfectly clean and well on the way to healing. This is a method which has been adopted the world over and is certainly a great advance.

My own experience covers not only the treatment of chronic osteomyelitis but also that of septic ununited fractures. During the war I had under my care fifty of such fractures which under the usual plan would have been treated solely for the osteomyelitis present in the hope that they would ultimately heal up and that after a year or so would respond to a bonegraft operation for the non-union. My experience with these fifty cases resulted in a paper on septic non-union in which we reported the results of a bolder policy, consisting of excision of the septic wound, removal of the sequestrum, reduction of any displacement so that the fragments were in good contact, the packing of the wound with bipped gauze, and the application of a plaster. The surprising outcome was that none of the patients died and nearly all united, so that a satisfactory result was achieved in a fifth of the time required by the old method. When Orr's papers began to appear in 1920, we added to the plan described the packing of the wound with vaselined gauze and covering with plaster and leaving the wound undressed for three or four weeks, until, indeed, the smell became intolerable. The results were undoubtedly surprising. Following a few days of fever, the temperature fell and all general signs of infection disappeared. When the plaster was ultimately removed the wound was found clean, covered with granulation, and well on the way to healing.

Whether this principle will have the same spectacular results in compound fracture, only time will tell. At present, however, the method is being adopted in England with great enthusiasm. In a letter received only a few days ago from one of my young surgical friends in the army, he told me that in his hospital all these terrific air raid wounds are being treated after the Orr method. The details in outline are:

1. Administration of concentrated serum or blood for shock.

2. Thorough washing of the injured part under anæsthesia.

3. Meticulous débridement of the wound and packing with vaseline gauze.

4. Reduction of the fracture on orthopædic table.

5. Application of plaster of Paris directly to the skin. This is laid on in specially shaped sheets wrung out of plaster cream, an operation that does not take more than five minutes.

6. The patient is given sulfanilamide by mouth and the wound is usually dusted with it as well.

7. The administration of toxoid to patients who have had two previous doses, or the administration of prophylactic antitoxin to those who have not.

Faced as we are by the powerful statistics of Trueta, by the long experience and teaching of Orr, by the enthusiasm of Matas, and now by the endorsement of the English and our own young surgeons, it seems like defeatism to apply the wet blanket. Nevertheless, I cannot help commenting on what an amazing thing it would be if it should be shown that we have been mistaken all these years in thinking that washing wounds with antiseptics was a good thing, and if it is proved that it is a better plan to cover them up and let them treat themselves. I cannot help thinking that there must be a great difference between wounds that are infected and those that are only contaminated and have not yet had time to become infected. A thorough débridement of the latter followed by packing and the application of a plaster will probably result in healing by granulation and without serious infection in a high percentage of cases. For such patients the Trueta plan is probably by far the best. For cases, however, that have lain out for hours and are definitely infected when they arrive at hospital, I find the greatest difficulty in believing that covering them up with a skin-fitting plaster can be anything but nonsense. Yet reports are appearing of patients evacuated from Dunkirk who were definitely infected and who did well with the Trueta treatment. I cannot help wondering.

But in spite of any misgivings we may have it would appear that a new idea has been presented to us and as such we should welcome it. As suggested before, these ideas should be thoroughly tested in experimental stations. It

is probably possible now to take two wards of 100 patients each and to treat one on the Trueta plan and the other on, say, the Carrel-Dakin plan and see which is the better. Within a few months, at least, a decision should be possible.

Quite aside from the principle of the occlusive dressing of the wounds, however, something must be said about the principle of maintaining the fragments of the fractured bones in good alignment and full length by a skin-fitting plaster alone. Trueta reduces the fracture by traction and then depends solely on the plaster for the maintenance of position. Our experience with this is that it usually leaves something to be desired and that some shortening is almost a certainty. Standards of excellence, however, must be expected to differ widely in the fracture service of a peace-time general hospital and the casualty stations of cities undergoing an air raid. For the latter I have no doubt the skin-fitting plaster is excellent, as it provides complete immobilization, allows the immediate transportation of the patient to distant bases without additional pain or shock, and it may make all further treatment of the fracture unnecessary. If on arrival at the base the x-ray shows the fragments seriously out of place the plaster can be removed and traction applied. All things considered, if I were over there I would certainly give the plaster a trial.

At a time like this one would like to review all the possibilities of improvement in the treatment of wounds that have developed since the last war. Without a doubt the marvellous advance that has been made, Mr. President, in the surgery of the brain, will show itself in the results of treatment of head injuries. The same is true of the surgery of the chest. It would be impossible, however, even if one were competent to do so, to touch on them in the short time at our disposal. But there is one suggestion, the development of which I have had the opportunity of watching, worthy of a moment's consideration. I refer to the part that heparin may play in rupture of the large arteries. In the battles of the great war when it was usually hours before the wounded were on the operating table of the casualty clearing stations, the chance of doing anything for a severed subclavian or femoral artery was slight. In these air raids on London, however, it will often be possible to get such patients to hospital and do

something for them. I was reading in Ambroise Paré a few days ago his instructions given in 1560, that when there is a compound fracture from gunshot, with section of the main artery, amputation should be performed at once. His teaching has stood for four hundred years. I keep wondering if it may not be possible to select some at least from such wounded people and with the aid of heparin to suture the injured artery, or, if too much has been destroyed to allow this, to bridge the gap with a vein graft or a Tuffier's glass tube. The experiments of Dr. Gordon Murray on animals certainly show that this is feasible, and in the half dozen cases of injuries to arteries that have come into hospital in the past year his clinical results have been brilliant. In these the severed artery was trimmed and sewn together with the result that the circulation was permanently restored. Even when glass tubes must be used it seems to me possible, as has been shown in the animals, that the bloodstream may be restored for sufficient time to allow collateral circulation to become sufficiently established to save the limb. These are possibilities which our young surgeons in the C.A.S.F. will have an opportunity to explore.

Gentlemen, we are at the beginning of another terrible war, which from all present signs bids fair to go on for years. The casualties which up to the present have been few may reach enormous figures before we can bring Germany to defeat. What can we do to prepare ourselves to be useful in such an emergency?

The answer is obvious to all who love their country. Those of us who are of military age and physically fit must be ready when the call comes to join up with new units or to relieve our colleagues who joined up with the first call and have already been long enough away. Those of us who are beyond military age or for physical reasons are not acceptable to the army must be prepared to carry heavier burdens here at home, and particularly to train up the students and young graduates so that they will be more useful when their time comes to join the army. With this in mind we are instituting courses in first aid, fractures and traumatic surgery, both for students and interns, and finding the time at the expense of courses that are more suited to civilian life. I was much struck the other night at hearing Colonel

MacFarlane say that there was a great dearth in England of surgeons who understood the use of plaster of Paris. It happens that with us plaster has been long in use and most of the staff are expert at it. There is no reason, therefore, why we should not turn out fifty officers a year who are almost as expert as their teachers. If this is done in all the medical schools of Canada we should have a constant supply of officers who are qualified for the work in hand.

Looking back across the years one cannot fail to be filled with pride at the achievements of the Army Medical Corps in the care of our wounded soldiers. The advance from the American Civil War and even the South African War is enormous. The practical elimination of gas gangrene and tetanus, the introduction of the bone graft, the suture of nerves, the transfer of tendons, the successful repair of wounds of the head, the thorax and abdomen, these are achievements of which our generation of surgeons may well be proud. But just as surgery advanced from 1900 to 1918, so it has advanced from 1918 to 1940, and I venture to predict that when the next ten years are over our successes during the Great War will be getting confused with those of the Crimea. There is one feature, however, in which 1940 must yield the palm to 1914 and that is in the matter of smell. Still, while it is

true, as Matas said, that the smell emitted by the patients while their casts were ripening, was somewhat of a shock to sensitive nostrils, nevertheless when he saw them get well with their wounds healed, he realized that "not all cheese that smells bad is bad."

#### RÉSUMÉ

Si nous revenons à la grande guerre no 1, la plus grande innovation fut sûrement l'attelle de Thomas, tandis que la plus importante mesure chirurgicale fut le débridement des plaies. Le chirurgien de la première ligne doit être vif, habile et judicieux. L'ère des antiseptiques a vécu. La méthode de Dakin-Carrel agit peut-être plus par l'irrigation que par l'antisepsie. Le "tank" de Taylor par ses alternances de pression peut rendre des services. Les bains hypertoniques locaux sont abandonnés. Il est à souhaiter que les dérivés de la sulfanilamide agissent efficacement dans la prévention de l'infection et que cette prophylaxie soit mise à l'étude sur une vaste échelle et entre des mains compétentes; déjà on rapporte des succès avec ces agents. Il est certain que le streptocoque hémolytique n'existe pas dans les plaies toutes récentes, mais qu'il survient plus tard et qu'il est probablement véhiculé par l'air contaminé de l'arrière. L'expérience de la guerre d'Espagne a appris que la meilleure méthode consiste à enfermer la plaie, même au cas de fracture, préalablement débridée et nettoyée, dans un plâtre occlusif pendant 4 semaines. Ce procédé augmente notablement la défense naturelle. C'est la technique de Trueta-Orr. Et cependant, il est difficile de juger cette méthode parfaitement sans faire encore plusieurs enquêtes. En Angleterre on a recours actuellement à la méthode de Orr et on en paraît satisfait; on y ajoute de la sulfanilamide, par la bouche et localement. Les plaies intéressant les gros vaisseaux sont désormais accessibles au traitement, comme, par exemple, les sutures artérielles, grâce à l'adjuvant extraordinaire qu'est l'héparine. Nous devons dès à présent former des jeunes chirurgiens qui soient en mesure de faire leur part de façon excellente lorsque le pays les appellera. JEAN SAUCIER

### EMPHYSEMA UNDER FORTY: CLINICAL AND PATHOLOGICAL SIGNIFICANCE\*

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AN abnormal depth of thorax in elderly persons is usually regarded as a part of the physiological process of ageing. It is a tentatively satisfying train of thought that such persons are suffering from deterioration of pulmonary capillaries with defective gas exchange, and that this in turn calls for a compensatory persistent increase in the depth of the inspiratory effort. The resulting permanently high or inspiratory position of the anterior ends of the ribs produces the common emphysematous form

of thorax, namely, abnormal antero-posterior depth, horizontal position and straightening of the ribs, and limitation of inspiratory movement. Kyphosis may follow, to make the true "barrel chest", presumably from a struggle to attain still greater air space.

When an emphysematous form of thorax is seen however in children or in adults under forty years of age we must think of something further than physiological deterioration. When emphysema under these conditions is associated with obviously severe disease, such as bronchiectasis, asthma, or chronic tuberculosis, this would seem to be sufficiently explained. When, however, as is very often the case, the individual

\* From the Mara Laboratories at the Queen Alexandra Sanatorium, London, Ont. Assisted by The National Research Council of Canada.

Courtesy, Staff of Westminster Hospital, London, Ont.

appears well and symptoms are slight or absent an abnormal depth of thorax is apt to be regarded as of no probable consequence, and comes in time to be viewed as falling within the normal range of limits. It comes about that practitioners, and even chest specialists, are not highly conscious of emphysema under these conditions, although it is in fact surprisingly common.

The trend of evidence from accumulating experience is that a beyond-the-usual depth of thorax is a sensitive and significant indicator of antecedent pulmonary injury, and that cultivation of a "deep-chest consciousness" may result in very large clinical and economic returns. Although such an impression has been in this author's mind for some time, it is only with the mobilization of the Canadian Army that more concrete evidence in this respect has become available.

There have of course been many casualties in the military forces due to acute respiratory infections and pneumonias. Military conditions in the present conflict differ sharply from those in civilian practice, in the ease with which frequent radiography is available during and following acute respiratory episodes. Especially different and especially significant is the fact that a pre-sickness chest film is in all cases available under military conditions, since a radiograph of each recruit is made at the time of enlistment. A variety of significant information concerning pulmonary disease has in this way become available, a part of which is incorporated in the present study.

The majority of respiratory acuties which have come to hospitalization in this military district consisted of radiographically visible patchy pneumonia, slight or severe. A lesser number comprised pneumonias of lobar distribution although these were also probably confluent lobular pneumonias. Less often, there were respiratory acuties without visible lesion.

Acute respiratory casualties, whose records were in this way complete, fall for the present purpose into two main groups.

In the first of these groups the symptoms and radiographically visible pneumonia disappeared relatively promptly, that is, in from one to three weeks. Complications and relapse were relatively rare, which may be due to the use of chemotherapy. No abnormal physical or radiographic findings remained on recovery; that is, there was apparently complete anatomical and clinical

cure. These persons have also shown no tendency to be respiratory repeaters.

The second of these groups separates itself from the foregoing by conspicuousness of delay in recovery. Cough, pain and dyspnea, etc., may persist for six to twelve weeks, or become permanent. Relapse and repeat hospitalizations were common. Radiographically, the group showed corresponding slowness of resolution of the visible pneumonia. The group as a class has a final distinguishing feature however, namely, that after the maximum of clinical recovery has occurred radiographic evidence of chronic pulmonary disease or injury usually remained.

Tuberculosis, vascular disease and other gross injury having been previously deleted by routine radiography, the most common residual shadow under these conditions consists of one or more of the following: (1) Thickening or matting of the broncho-vascular markings, either generalized, or confined to one or both bases. (2) Displacement of heart, diaphragm, interlobar fissures, or other landmarks, often with deformity of outline. (3) A pathological degree of localized ring-shadows. (4) Persistence of broncho-pneumonia-like or amorphous-appearing fibrotic shadow.\*

Such changes which are variously named chronic infectious basal disease, chronic non-tuberculous disease, chronic post-pneumonic disease or injury, chronic pneumonitis,<sup>2</sup> pulmonec-tasis,<sup>3</sup> etc. etc., may be of any intensity, from slight to gross. They may or may not be found to be associated with bronchial dilatation if studied with iodized oil, but it is important to know that bronchiectasis may not infrequently be proved to exist when only surprisingly trivial shadow of the kind is present.

We have elsewhere shown that shadows of this kind are probably best explained as being the product of inflammatory reaction and pulmonary traumatism subsequent to pneumonia and patchy atelectasis, whether or not a previous pneumonia or pneumonia-like episode is identifiable.<sup>3</sup> The injury is probably essentially the same in origin and general significance whether or not bronchial dilatation is shown to be present. There is good evidence that "fibrosis", which has long held the rôle of basic damaging agent, is in reality a late-comer in the picture, and that the first cause of deformity of tissue and failure of anatomical "cure" is an ubiquitous patchy atelectasis.<sup>1, 3</sup>

\* Reviewed at greater length elsewhere.<sup>1</sup>

In this sense, the too constant use of the term "fibrotic disease" in connection with chronic pulmonary injury may have pernicious tendencies because of persistent misdirection of the train of thought.

At this point it is important to note that unless the disease is of substantial intensity sharpness of image in the film is more essential for its identification than is the case in pulmonary tuberculosis. Failure of sharpness of shadow may itself simulate chronic basal disease, and the reality when it occurs may be thus overlooked. It is also open to question whether fluoroscopically reduced small chest films, though apparently sufficient for tuberculosis surveys, may not miss a disproportionate amount of chronic non-tuberculous basal disease, and an important part of the savings be thus neutralized. As will be shown later, this is probably much more important in military than in civilian or industrial practice.\*

It might appear however that what we have been describing is merely incompletely resolved and organizing pneumonia, and as such is common knowledge. A survey, however, of the clinical picture and of the pre-sickness x-ray film reveals another story. In the great majority of pneumonias which fall into this second class of "delayed cure" disease as here described, a survey of the pre-sickness x-ray film shows that part or all of the abnormal basal shadow was present *before* the acute pneumonia occurred. Further, if the thorax is inspected, again in the great majority it will be found that it is abnormal in depth and emphysematous in form. It is clear then, that we are here viewing, not the effects of a fresh accident in a normal chest, but an acute pneumonia superimposed upon antecedent chronic pulmonary injury. It seems fair to assume that the emphysema and radiographically visible injury are related to the parallel tendency to unfavourableness of course and failure of cure; that is, that they are cause and effect. These observations have presumably been slow in coming to light in the civilian population, for the simple reason that a pre-pneumonia x-ray film is rarely available.

Reversing these observations, some significant deductions are warranted.

\* The "reduced film" system we understand is being used for examining trainees in the United States, but full sized 14" x 17" films are used for chest radiography for the Canadian Army.

1. *Method of examination.*—An abnormal depth of thorax or other stigmata of emphysema should be meticulously looked for in all clinical reviews of the thorax; the clinician should become "emphysema conscious". The sign is very common in the elderly and not uncommon in the young. We prefer to examine with the patient standing. The hands should be clasped together in front, with the elbows slightly bent, to rotate the scapulæ outwards and forwards. The shoulders and chin should be "drooped", and the thorax viewed from the side. The decision as to normalcy or otherwise of the depth of the thorax must of course depend upon the experience of the clinician. Once "emphysema-conscious", the decision is not usually difficult. It is our impression that when an injury occurs sufficient to create an emphysema, the reaction is usually sufficiently definite to be more or less obvious if looked for; that is, border-line or difficult decisions are the exception. The observer should resist a tendency to give in to a too superficial impression that a "deepish" chest conforms to the build of the individual, and is therefore not pathological. Hyperresonance to percussion, limitation of thoracic wall and diaphragmatic movements, etc., should also be looked for. We believe however that abnormal depth of thorax is much the most sensitive and positive indicator that pulmonary injury of such extent and quality as to cause significant "space hunger", has occurred. Emphysema, it should be observed, does not admit of precision of identification radiographically, and the onus of recognition is thus to a considerable extent thrust upon the clinician.

2. *Results.*—On the basis of both reason and experience it is probably correct to regard an abnormal depth of thorax as always reflecting a significant past injury. In elderly persons it may be that this is solely the result of vascular deterioration, "normal" or accelerated. It is our experience that such deteriorative changes are quite common after forty-five years of age and not rare in the forty to forty-five group. "Death" perhaps "begins at forty".

In less than elderly persons, an abnormal depth of thorax even when slight, is a mast-high signal that important traumatism may have happened to the lungs, even when clinical corroboration is slight or absent. Radiography is always called for. Tuberculosis, vascular



## PSYCHOLOGICAL FACTORS IN AVIATION

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I WAS asked the other day whether I was going to prove that the psychological factors in aviation were reducible to one principle, namely, the individual's desire for a "flight from reality", or that flying was merely an "escape mechanism" into the blue. This brought home to me once again how seldom the psychologist's province is ever expected to be what it actually is, and how frequently people are doomed to disappointment in the rather prosaic information which he is actually able to impart. I have therefore altered my title a little so that it epitomizes more closely the kind of information I am able to give you: "In which aspects of aviation can the experimental investigation of the psychologist be of value?" is perhaps nearer the mark.

## I.

There are, I am sure, a great many ways of subdividing such a topic, but for my present purposes I have grouped the problems under five headings, which I may outline first, returning to each in detail afterwards.

1. We have what might be called the psycho-physiological studies of high altitudes or in reduced-oxygen chambers. Such studies attempt to answer the question: to what extent is the human organism incapacitated psychologically by these unusual physical conditions and thereby unable to function normally?

2. There is the application to aviation of the broad psychological problem of selecting the right person for a given job. In this case, of course, it involves the selection of the best type of individual to become a pilot, gunner, or observer, or other aviation personnel. Such a task involves a fundamental understanding of the activities which the individual would eventually undertake, and the construction of tests which bear a direct relationship to that activity. Then follow the administration of such tests to the candidates and the evaluation of their respective abilities.

3. There is that province where the pupil learns and the instructor trains, once these

"most fit individuals" have been selected. This is, of course, nothing other than the extension of the psychology of learning in general to the specific task in hand. For example, what factors will facilitate this particular learning process? How can we keep track of the type of faults that are being made? How can the estimation of the trainee's progress be most accurately and objectively arrived at?

4. There is that important area outside pure psychomotor aptitude, outside learning ability and mechanical progress, which we may call the estimation of the individual's emotional or nervous stability. In this field the psychologist should bring to bear such tests as will prevent the emotionally unfit from ever embarking on the extensive training and should be able to help in eradicating those pilots who later in the course of training are showing a serious effect of accumulated or sudden strains.

5. The psychologist must try and envisage life as it looks to the aviator. He must be cognizant of the specific difficulties inherent in this particular career. This is where it seems to me that Armstrong,<sup>1</sup> though not a professional psychologist, has made such an important contribution.

To return now to the first mentioned studies, those we have called the psycho-physiological. These are the direct counterpart, the reverse side of the mirror, one might say, of the physiological studies made under similar conditions of reduced oxygen. It is clear, I think, that neither physiological nor psychological studies alone can present the whole picture under these circumstances. For while in the field of vision or audition objective changes may be demonstrated physiologically at high altitudes, only the individual himself can tell you when he ceases to *see* a light or *hear* a sound. Or, again, while it may be demonstrated by physiological techniques, that eye-movements of convergence are slower at high altitudes, only by psychological investigations can it be shown that the individual takes longer to *read* and understand the print his eyes are travelling over. That is, the subjective psychological experience is as important as the objec-

tive measurement of the altered physiological processes.

As an illustration of such psychological studies done under diminished oxygen consumption I have taken those of Ross McFarland.<sup>4, 5, 6</sup> McFarland has worked with both aviators and trained scientists in reduced oxygen chambers, at high altitudes in the Andes, and also on actual high altitude flights, and deserves great credit, I think, for the interest he has awakened in this aspect of aviation. The tests which were used aimed at showing in what way the individual is impaired psychologically under these unusual conditions. All the tests were, of course, given first at sea level to establish norms against which the performances at various altitudes could be compared.

Some of the psychological functions which were measured by McFarland were: simple and choice reaction time, neuro-muscular control, form perception and memory. In addition to this, introspective reports were obtained from the various individuals concerning their experiences.

Some of McFarland's results may be epitomized briefly:

1. Simple sensory and motor responses are not seriously impaired until the subject approaches collapse from lack of oxygen.

2. Choice reactions on the other hand are impaired much sooner, beginning in the neighbourhood of 11,43 per cent (17,000 feet) and gradually getting worse with increased deprivation.

3. Neuromuscular control, as measured by the pursuit meter and Guidit test, is affected before the loss of capacity in more highly organized functions.

4. Higher mental processes are impaired, with a loss of memory, particularly in the estimation of time and attention.

5. There is evidence of irrational or fixed ideas and loss of capacity for "sane judgment and self-criticism".

6. Unusual emotional outbursts may occur.

## II.

The contribution of psychology to the selection of pilots was summed up in 1919 in the U.S. Air Service Medical Laboratory Manual as follows: "The function of psychology in respect to the aviator is to study his adaptability to the work required of him". I think that this definition probably still holds good, although the functions tested and the tests themselves undergo considerable modification. In 1919, as quoted by Armstrong,<sup>1</sup> it was felt necessary to test the aviator with regard to the following functions: perception and discrimination, control of voluntary activity, maintain-

ance of equilibrium and orientation, memory, associative thinking, emotional responses, attention, and habit formation and learning. Since, as was seen in the last section, all these functions are to some extent affected at high altitudes it is obviously important that the pilot start with the best possible psychological equipment.

Much of the psychological research at the present time in regard to aviation goes into the construction of better tests which will give as much of the essential information as possible; and, just in so far as these tests are satisfactory there is naturally reluctance on the part of those using them to have them receive publicity. Very generally, it may be said that psychological tests given to pilots before embarking on their training at the present time include tests of general intelligence and those for special flying aptitude. A recent modification of a standard intelligence test which has been used in some places also claims to give information concerning the potentially unstable individual as well as information on general intelligence.

In addition to this test of general intelligence, there are the special tests for air-aptitude of which one may serve as an illustration—the Mashburn Serial Action Test. This test has been described as follows:

"The apparatus roughly simulates the rudder and control stick in a small aeroplane. The signal panel consists of three double rows of parallel lights. In each row of lights a red one appears which is to be matched by a green one by coordinated movement of the controls operated by the hands and feet as in flying an aeroplane. The correct response to a set of signals automatically sets up the succeeding signal until the series is completed. A reactor's score is the total time required to run through a complete series of forty different settings."

It is fairly generally agreed, I think, that the Mashburn Serial Action Test is a particularly good one; that is, the test has a very fair degree of accuracy in predicting a particular type of air-aptitude. For example, figures from Randolph Field indicate that the mean time for completing the test is 5.40 minutes, with a range from 2.50 minutes to 15 minutes. Recently, on examination of 1,713 student pilots it was found that 77 per cent of those who completed the test between 3 and 4 minutes learned to fly successfully, while only 16 per cent of those taking longer than 8 minutes learned to fly.<sup>7</sup>



### III.

With the psychological difficulties at high altitudes known, and our potential pilots selected, the next step in psychological investigation is obviously the learning or training periods of the pilots. I may indicate two problems in this field.

What is it that the pilot must learn and how can psychological analysis of the task facilitate his learning? Such a question belongs in what is technically known as "job analysis". Some of you may know the time and motion studies in industry which were an important contribution of industrial psychology in the last decade. In a given job, for example, the performance of the worker is photographed and analyzed in slow motion, so that unnecessary movements are eliminated, and all apparatus and machinery placed so as to afford the individual the maximum comfort and the minimum expenditure of unnecessary energy while he works. Such studies are in progress in aviation, and on the basis of them a "standard flight" is being worked out so that comparable performances between student and student or between student and instructor can be analyzed.

Another aspect of the learning problem pertains to the student-instructor relationship, and a very pertinent investigation has recently opened up in this field under McFarland's guidance. McFarland found that progress was more rapid if instead of a student's ability being criticized and evaluated the discussion centred around the impersonal performance of the plane. For example, the instructor and his student both fly a standard identical course. During the course records are automatically taken in the machine of how the machine is behaving, how it is flying, on both these occasions: then these records are compared.\* In the student's flight it can be seen that the ship did so and so. In the instructor's flight it behaved thus and thus. Which is the better? Why? A demonstrable, objective indication of a difference can be seen, and an impersonal assessment of the performances made.

Some very ingenious devices are still under construction, and therefore, I suppose, strictly speaking, are not available for detailed comment, relating to the detection of pilots who

during their training are overtense. This seems to be one of the major problems during the training period. For example, there is a stick in use which registers the tightness of the grip. There is a multiple polygraph which measures the tension in numerous muscles. There is even a micro-hygrometer, an instrument which makes possible the obtaining of a continuous record of palmar sweating during actual flight. While it is not possible to discuss these in any great detail, merely to indicate them is sufficient, I think, to let you see along what lines psychological investigations are trending.

### IV.

The fourth aspect, that of tests for nervous and emotional stability, is, I believe, the most important of all, although to date it lags behind the others.

It seems pretty generally agreed among authorities that, on the one hand, the pilot's nervous and emotional stability is of prime importance, while on the other hand the existing tests for its estimation are inadequate and actually misleading in some cases.

For example, Group Captain Ryan,<sup>8</sup> asks the question:

"What extra assets are necessary (other than physical fitness) to ensure that, if accepted, the pilot will continue to carry out his flying duties under all circumstances and conditions?" And he answers: "The first asset is nervous stability."

Similarly, Lt.-Comdr. R. Barry Bigelow,<sup>2</sup> writes that in his opinion as many as 90 per cent of the failures in training result from this particular factor, namely, emotional instability. Speaking of the tests in use he says:

"None of the methods so far considered are primarily directed towards evaluating the *higher levels of integration* to which we refer by such terms as total personality, with its subjective aspects of affectivity, consciousness and volition, and its objective aspects of behaviour. Our studies of morphology, physiology and psychomotor co-ordination supply us with information concerning the limitations within which the total organism must function, and so serve to eliminate many who are disqualified for flight training, but those methods have thus far not enabled us to predetermine with any accuracy which individual will function sufficiently well within those limitations to perform adequately in military aviation."

What are the tests which are currently used? They are chiefly those of the questionnaire type, amongst them the Bernreuter Personality Inventory, of which some questions are quoted here:

\* These "flight-analysers" as they are called, are manufactured by the Impact Register Co., Campaign, Ill., and by Julien P. Friez & Sons, Baltimore, Md.

- Yes No ? If you see an accident do you quickly take an active part in giving aid?  
 Yes No ? Do you get stage fright?  
 Yes No ? Do you like to bear responsibilities alone?  
 Yes No ? Have you ever had spells of dizziness?  
 Yes No ? Do you often experience periods of loneliness?  
 Yes No ? Do you usually prefer to do your own planning alone rather than with others?  
 Yes No ? Do you make friends easily?  
 Yes No ? Do you lack self-confidence?  
 Yes No ? Are you willing to take a chance alone in a situation of doubtful outcome?

The individual taking the test rates himself in terms of *yes*, *no*, or *uncertain* (or ?) on 125 such questions.

McFarland,<sup>7</sup> who used this test with 200 pilots, reports that it is "too suggestive and one tends to answer questions in terms of what one believes to be the socially accepted answer". He concludes that it "proved of little value in studying the psychological characteristics of the pilots." Bigelow,<sup>2</sup> also, on the basis of experience with pilots reports "that such tests as the Bernreuter should not be used here as they take the form of questions which the candidate will answer in whatever way he believes most apt to result in his being accepted for the flight training."

On the basis of similar experience with college students I have stated elsewhere:<sup>3</sup>

"Direct questions to the subject concerning his own feelings, emotions, worries, and psychosomatic sensations give us at best the subject's picture of himself, and may in some cases lend themselves to a frankly false estimate of a person's temperamental qualities."

The other acceptable method of measuring emotional stability, which is advocated by McFarland<sup>7</sup> in place of a better one, is the personal interview. McFarland feels that this is preferable to such tests as the Bernreuter. Armstrong,<sup>1</sup> however, comments that an adequate interview must take between 3 and 4 hours, while Bigelow<sup>2</sup> feels

"that the difficulties inherent in this method of personality study, (namely, the interview) are much increased in the case of candidates for flight training by a very understandable lack of co-operation on the part of the subject."

He goes on to say that the

"type of test which would be most useful for this purpose should then be objective, and so designed that the candidate could have no means of knowing what type of response might be acceptable."

Bigelow's solution is the same as that advocated by Harrower-Erickson,<sup>3</sup> namely, that in the *Rorschach method of personality evaluation* we have just such an objective test, for, as the subject takes this test there is

"no artificial personality ideal to which he can attempt an approximation, while indications of neurotic behaviour or emotional instability are evidenced in ways quite beyond his control or remotest knowledge."

Bigelow states his position in the following summary:

"it has been found that by analyses of the responses . . . (to the Rorschach test) . . . it is possible to construct an extraordinarily accurate picture of the subject's personality with the tendencies toward stability or imbalance, the strength of its motivating drives, its tendencies to react to stimuli predominantly from within or primarily from outside itself, the efficiency and reliability of the means used to combat, control, or repress instinctive reactions, and many others. Of all these varieties of information available perhaps the most useful for our present purpose may be the evaluation of the degree of emotional reactivity and the methods which have been established to control this. It is obvious that a pilot must not be overwhelmed by either fear or anger in a stressful situation because however excellent his somatic and psychological status he will then be unable to fully use his carefully acquired training and to respond in accordance with it. The same man who made a very high score on serial reaction tests in a quiet room or in the Link Trainer may perform quite inadequately under such circumstances, and probably should not be allowed to place himself, valuable machinery, and perhaps other men in such an impossible situation."

"On the basis of this brief review it seems fair to conclude that we have available or in actual use adequate tests of aptitude for flight training on the somatic, physiological, and psychomotor levels, but that due to the complexity and special difficulties of the problem we have not yet achieved a satisfactory means of psychological evaluation for this purpose. This is the more unfortunate since it is generally agreed that a very high proportion, perhaps approaching 90 per cent, of the failures to complete courses in military aviation are due to causes which fall in this category."

The most recent information allows us to state that the Rorschach method of personality evaluation is now being used in the selection of candidates for training at Pensacola, the United States Navy Air Station. Moreover, a modification of the method, to allow its use with large numbers at the same time, is at present being validated and standardized at the Montreal Neurological Institute.\*

## V.

I have not gone into Armstrong's contribution in detail, for I think that his book is readily accessible. Further, although an acute psychological observer, he makes no claims to be a professional psychologist. I might, however, close with one quotation which shows his sympathetic understanding and clear-sighted recognition of the stresses and strains inherent in this career.

\* This investigation was made possible by the Josiah Macy Foundation, New York City.

"When an individual enters on his career as a pilot he is essentially physically perfect, with a high degree of intelligence, filled with ambition, possessed of great natural courage, fired with enthusiasm, and devoted to duty. The irresponsibility of youth, the pride of accomplishment, the zest of living, and the ignorance of inexperience carry him blithely through the first few years. Gradually, however, as time passes, physical perfection is replaced by physical defect and physiologic change, ambition by apprehension, reckless courage by cool judgment, irresponsibility by responsibility, youth by age, and inexperience by experience; in other words, there has been created a situation in which instinctive desires conflict with social regulation. . . ."

"The many avenues of escape from his situation are naturally obvious to the individual but to this personality type, the price is too high. . . . Thus these individuals are beset with a myriad of profound emotional stresses, some repressed, some clear to the intellect, all capable of producing marked reactions. . . ."

This situation frequently leads to what Armstrong has called aeronucrosis.

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#### RÉSUMÉ

Cinq facteurs sont à envisager dans l'entraînement aéronautique. 1. Les principales réactions physiopsychologiques à l'altitude ou à la privation d'oxygène sont une augmentation du temps de réaction, une diminution du contrôle neuro-musculaire, l'imprécision de la perception et l'amnésie. 2. Psychologiquement l'aviateur doit s'adapter à sa tâche. Il doit subir avec succès les tests habituels d'intelligence et certaines épreuves spéciales en rapport avec le maniement d'un avion et avec les circonstances propres à l'aviation. 3. Le meilleur moyen de réaliser un bon entraînement consiste à comparer impersonnellement le comportement de l'aviateur entre les mains de l'instructeur et entre celles de l'élève, puis à souligner les défauts et à suggérer les améliorations à apporter. 4. Des tests, encore imparfaits, de stabilité nerveuse et émotive sont établis, mais une bonne "interview" de 3 à 4 heures paraît préférable. Le test de Rorschach est peut-être encore meilleur. 5. Le psychologue doit envisager la vie comme il le ferait s'il était aviateur avant d'examiner et de classer un candidat.

JEAN SAUCIER

## THE INTRACRANIAL USE OF SULPHONAMIDES: EXPERIMENTAL STUDY OF THE HISTOLOGY AND RATE OF ABSORPTION\*

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THE sulphonamides when placed in contaminated wounds have been shown by numerous observers to have a beneficial bacteriostatic effect. This histological and chemical study was planned to discover whether these drugs have any unfavourable influence upon the healing of brain wounds when the drugs are introduced at the time of experimental cerebral laceration. Under military conditions it is obvious that so much time must elapse between time of wounding and the time of débridement and suture that dangerous contamination has frequently occurred. Two important questions immediately arise when one considers placing drugs of this group directly into the brain: First: Do they destroy brain tissue, cause any important meningeal reaction, or in any way exercise an undesirable effect on the healing of brain wounds? Second: Does the low degree of solubility of several drugs of this group

(especially sulfapyridine) result in encapsulation and indefinite persistence of the drug? And does the use of such drugs increase the likelihood of eventual post-traumatic epilepsy?

To answer these questions, the powdered form of the three most popular drugs of the group at the present time was employed: sulfanilamide, sulfapyridine, and sulfathiazole. About 25 cats were used in the experiments. Operations were carried out under aseptic technique.



Fig. 1.—Photograph showing nature of operative wounds. Right 7440a; left 7440c.

\* From the Department of Neurology and Neurosurgery of McGill University and the Montreal Neurological Institute.

To answer the first question—a cortical excision of 0.5 to 1 cm. in diameter and of a depth to include part of the white matter yet not enter the ventricles was made in each hemisphere, as shown in Fig. 1. The cautery was used only on the pial vessels and always to an equal extent on both hemispheres. In other respects also the wounds were made as nearly alike as possible, *e.g.*, if a silver clip was used on one side one was used on the other, whether necessary or not.

The drugs were inserted into one wound and the other wound was used as a control as is shown in Table I. The area was then covered in most instances with amnion to prevent loss of the drug by washing away into the subarachnoid space, etc. Relatively large amounts of the drug were used (an average of 100 mg.). The dura was finally closed as tightly as possible. There was some deviation from this method in the first few cats operated on, but

in every instance conditions were as nearly identical as possible in the two sides of each cat.

The age of the wounds before autopsy as well as the significant histological findings are indicated in Table I. There were collections of polymorphonuclear leukocytes about the meninges in several cats inconsistent with the findings in others. The distribution of these collections and the fact that they were present on the side without the drug as well as on the side with it and remained after the drug was completely absorbed suggested that they were due to the presence of foreign bodies (silver clips and sutures). This was proved conclusively in cats Nos. 141 and 241 in which a silver clip was placed in the wound without the drug but not in the wound containing the drug. In these the leukocyte reaction was seen only about the silver clip.

The accompanying picture illustrates the ap-

TABLE I.

Slide number Days with drug (c): Days without drug (s):	Drug P=present A=absent	Damage to nerve cells (D): Absence of nerve cells (Ab)	Leukocytosis	Metamorphosis and hypertrophy of microglia	Glasmato- dendrosis	Astro- gliosis	ol= oligoden- drosis s= satellitosis	Fibrosis	Meningeal reaction
<b>SULFANILAMIDE</b>									
4840B c 4 da.	P	0	plus				s	0	slight
4840A s 4 da.	A	D D	plus				s	0	very slight
5840A s 10 da.	A	D	0	plus	plus	3 plus	0	0	0
5840B c 10 da.	A	0	0	2 plus	plus	3 plus	0	plus	0
5240B s 4 da.	A	Ab Ab	plus				s	0	0
7540A s 64 da.	A	0	plus	plus	0	2 plus	0	plus	plus*
7540B c 64 da.	A	0	plus	plus	0	2 plus	0	plus	plus*
<b>SULFAPYRIDINE</b>									
5040A c 4 da.	P	Ab	0	plus			s and ol.	0	very slight
5040B s 4 da.	A	0	0	plus			s and ol.	0	very slight
6340A s 20 hr.	A	Ab	0	(plus) (0)			ol.	0	plus
6340B c 20 hr.	P	Ab	0	(plus) (0)			ol.	0	2 plus
6240A s 20 da.	A	0	0	plus	0	3 plus	0	plus	0
6240B c 20 da.	P	0	0	plus	0	3 plus	0	plus	plus*
6440A s 33 da.	0	0	0	2 plus	0	3 plus	0	plus	0
6440B c 33 da.	A	D	0	plus	0	3 plus	0	plus	0
7440A s 68 da.	A	0	0	plus	0	2 plus	0	plus	plus*
7440B c 68 da.	A	0	0	plus	0	2 plus	0	plus	plus*
241A s 12 da.	A	0	0					0	plus*
241B c 13 da.	P	0	0					0	0
<b>SULFATHIAZOLE</b>									
5140A c 4 da.	P	Hæmorrhage							very slight
5140B s 4 da.	A								very slight
5940A s 21 da.	A	0	0	plus	0	3 plus	0	plus	0
5940B c 21 da.	A	0	0	plus	0	3 plus	0	plus	0
6540A s 60 hr.	A		0					0	plus
6540B c 60 hr.	P		0					0	2 plus
7640A s 60 da.	A	0	0	plus	0	2 plus	0	plus	plus*
7640B c 60 da.	A	0	0	plus	0	2 plus	0	plus	plus*
141A c 7 da.	A	0	0					0	0
141B s 7 da.	A	0	0					0	plus*

\*These cats showed collection of polymorphonuclear leukocytes about the meninges. For a more complete description see text.

pearance of the wounds macroscopically. Data concerning this picture may be obtained from Table I.

To answer the second of these questions, similar operative procedures were carried out. Known quantities of drugs were inserted in the wounds, as shown in Table II. (In some instances two different drugs were used in a single cat. Cat. No. 2613 illustrates the fact that the presence of drug in one hemisphere does not affect the accuracy of analysis of the opposite hemisphere). The wounds were then carefully sealed with amnioplastin and the dura closed as

tightly as possible, any bleeding having previously been controlled with silver clips.

The cats were allowed to live for as many days as is indicated in Table II. At autopsy the brain and attached muscle were carefully removed. The two hemispheres were separated and each wound, together with a large area of surrounding cerebrum, was excised and ground with sand.

The method of extraction described by Maher and Camp<sup>1</sup> was used with the following modifications. From 100 to 200 c.c. of alcohol, depending on the amount of drug expected, was

TABLE II.

Cat No. or Control No.	Amount of drug inserted	Days post-operative before autopsy	Amount of drug detected	Amount of drug absorbed	Remarks
Control No. 1	100 mg. sulfanilamide	0	90 mg.	0	
Control No. 3	10 mg. sulfapyridine	0	9.8 mg.	0	
Control No. 7	no drug	0	less than 1/100 mg.	0	<i>i.e.</i> , less drug present than could be detected.
Control No. 8	0.6 mg. sulfanilamide	0	0.5 mg.	0	
Control No. 9	1.4 mg. sulfanilamide	0	1.4 mg.	0	
Cat No. 2593	260 mg. sulfanilamide	26 days	less than 5/100 mg.	260 mg.	<i>i.e.</i> , 500 c.c. alcohol used in the extraction and there was less drug present than could be detected.
Cat No. 2597	230 mg. sulfanilamide	30 days	less than 2/100 mg.	230 mg.	<i>i.e.</i> , 200 c.c. alcohol used in the extraction and there was less drug present than could be detected.
Cat No. 2615	80 mg. sulfanilamide	25 days	less than 1/100 mg.	80 mg.	<i>etc.</i> , as above.
Cat No. 2627	150 mg. sulfanilamide	11 days	less than 1/100 mg.	150 mg.	<i>etc.</i> , as above.
Cat No. 2620	140 mg. sulfathiazole	11 days	32 mg.	108 mg.	Figures here may not be entirely accurate for the amount of drug inserted was estimated, not weighed.
Cat No. 2613	80 mg. sulfathiazole	17 days	less than 1/100 mg.	80 mg.	<i>i.e.</i> , 100 c.c. alcohol used in the extraction and there was less drug present than could be detected.
Cat No. 2609	80 mg. sulfapyridine	8 days	32.5 mg.	47.5 mg.	
Cat No. 2620	about 110 mg. sulfapyridine	11 days	25 mg.	85 mg.	Figures here may not be entirely accurate for the amount of drug inserted was estimated, not weighed.
Cat No. 2613	70 mg. sulfapyridine	17 days	5.8 mg.	64.2 mg.	
Cat No. 2615	110 mg. sulfapyridine	25 days	2.4 mg.	107.6 mg.	
Cat No. 2616	105 mg. sulfapyridine	34 days	less than 1/100 mg.	105 mg.	<i>i.e.</i> , less drug than could be detected.

used instead of 500 c.c. so as to obviate missing very small amounts of drugs. Heat from a 25-watt bulb was applied during maceration to increase the solubility of the drug. Results obtained by use of the colorimeter were checked by the photo-electric cell.

**Controls.**—The amounts of the drug shown in Table II were ground with fresh cats' brain. Extraction was then carried out as described above. It was also found that in standard solutions the method of analysis used was quantitatively accurate down to 1/10 mg. per cent and qualitatively down to 1/100 mg. per cent.

#### SUMMARY

1. The drug causes a focal meningeal leukocytic response which soon disappears and is probably of little or no consequence.

2. The drug was seen macroscopically or microscopically as late as 20 days. In some instances it was seen in gross but not microscopically, due no doubt to washing-out during the staining processes. Chemical analysis (experiment No. 2) is more reliable in determining the rate and extent of absorption of various drugs.

3. The drug even while present causes but a minimal focal foreign body reaction. This is much less than what one sees as a result of implantation of silk suture material or silver clips.

4. There is no constant evidence of neuronal destruction or glial reaction resulting from its application to excised wounds of the brain.

5. The ultimate result of the healing of wounds to which these drugs have been applied does not in any way suggest that they increase the extent of scarring or act as carcinogenic substances (coal tars, etc.).

6. The method of extraction and chemical analysis here described is accurate in detecting

qualitatively the presence of less than 5/10 mg. of drug in the brain. Smaller amounts than this are probably of no practical importance clinically.

*Sulfapyridine* is the slowest of the three to be absorbed, but cannot be detected after 34 days.

*Sulfathiazole* cannot be detected after 17 days.

*Sulfanilamide* cannot be detected after 11 days.

#### CONCLUSIONS

Certain characteristics of these drugs must be borne in mind if one is to obtain good results in the prophylactic or active treatment of infection in brain wounds. Of especial importance is the fact that they exercise their effect possibly by inanition of organisms, at any rate in some manner that necessitates a high concentration of drug at the site of infection over a long period of time. Such high concentrations are not contraindicated in the central nervous system. (On a basis of the relative weight of brains the amounts used in the animals would correspond roughly to the use of 5 to 10 grams of the powdered form in the human brain).

Results obtained when sulfanilamide, sulfapyridine or sulfathiazole were applied directly to the brain rule out any contraindications to their use in this manner. Observations reported here should not be construed to include other derivatives of the series, *e.g.*, soludagenan, which because of its high degree of alkalinity is quite caustic.

Sterile sulfathiazole powder was kindly supplied for these experiments by Winthrop Chemical Co.

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**THOMAS SPLINT: SIMPLE DEVICE FOR EXTENSION.**—Dr. John A. Hayward writes: Various methods suggested in textbooks or correspondence are in use for securing extension in the application of a Thomas splint at the site of casualty. In the absence of skewers to go through a boot, spats, gaiters, or roller bandage to form a clove hitch round the ankle, a very simple device requiring only two triangular bandages will make a quite satisfactory extension with no undue pressure on the foot. (1) Place the centre of a narrow-fold triangular bandage under the concavity above the heel, cross the ends over the front of the ankle somewhat loosely, then wind them round the circle thus formed to make a ring encircling

the top of the boot or ankle—a ring pad. (2) Place the centre of a narrow-fold triangular bandage across the sole of the boot immediately in front of the heel, bring the ends up on each side, and draw them through the ring; turn the loose ends downwards, and grasp them together in the right hand to make the necessary extension. The ends are now slipped through the ring of the splint, and the left hand takes up the extension as the splint is slipped upwards. Both hands are now available for tying the ends over the notch on the cross-bar by the usual methods. In first-aid classes I have found that the clove-hitch adjustments are a source of difficulty, and unless very carefully performed cause undue movement of the limb.—*Brit. M. J.*, 1941, 1: 304.

## GLOMUS TUMOURS: CLINICAL PICTURE AND PHYSIOLOGY\*

By J. HAROLD COUCH, M.A., F.R.C.S.

*Toronto*

THE increasing frequency with which glomus tumours are appearing in medical literature indicates that this strange lesion is fairly common and should be recognized when present.

The normal glomus, as stated by Dr. Blanchard is a peculiar organ combining in its make-up some elements of nerve tissue, vascular tissue, and muscular tissue. The clinical syndrome produced by any disturbance, therefore, presents elements pertaining to all these tissues or systems. In this communication a typical illustration of the clinical picture is presented, with the exception that no tumour was demonstrated. The absence of actual growth is mentioned by other writers and only serves to emphasize the fact that symptoms and signs are so definite as to permit diagnosis of glomus tumour even though no tumour can be seen or felt.

## CASE REPORT

The patient, a man of 40 years, complained consistently and bitterly of pain in the 4th left finger nail, which had lasted for three years. The pain was of an agonizing, burning type made worse by the slightest pressure, and yet firm pressure relieved him. Any touch on the side of the nail was so distressing that he trimmed his nail only with difficulty.

In his search for cure the patient had visited doctors all the way from Harley Street to Toronto, and his treatment had ranged from the administration of sedatives, to operation for so-called "ingrown nail". Suggestions as to diagnosis ranged from those which labelled him as a neurotic to those which advocated amputation of the finger.

On examination, there was absolutely nothing to see or feel in the region complained of, no subungual mass, no alteration in nail, no discoloration, as is sometimes described. However, the entire hand was soft, hot, more pink than its fellow, and was so moist with perspiration that the patient constantly resorted to a handkerchief to wipe it off. The slightest pressure against the side of the nail initiated pain, which was so acute that the patient could not prevent himself shrinking even though he was determined not to yield. The pain radiated up the hand and as far, sometimes, as the side of the neck and head. His face perspired more on the same side as the painful finger, and when pain was at its height he showed a moderate Horner's syndrome, with its sunken eye and drooped lid. It was possible, by careful exploration with the tip of a pencil, to locate one point of maximum sensitivity near the base of the nail.

A diagnosis of glomus tumour was made, and at operation the half of the nail overlying the sensitive area was removed. Still no tumour could be found. Therefore, the nail bed corresponding to the removed nail was taken away in one-block. Within two hours the patient stated that the severe pain, of which he

had complained for three years, was gone and he has remained well ever since that time. Microscopic examination of the tissue removed revealed a glomus tumour. (See pathologist's report in Dr. Blanchard's paper, p. 360).

## THE THERMOSTATIC FUNCTION OF GLOMUS

Experts in thermo-dynamics state that the human hand is an almost perfect radiator of heat, due to its thin, flat shape and to the large surface exposed to the air by the skin covering the fingers. The foot is almost as good a radiator if exposed to the air. Glomera appear as normal organs predominantly on hands and feet; rarely are they found elsewhere. The suggestion, therefore, that they function in connection with heat regulations of the body seems logical. Further support is provided for this suggestion by the fact that glomera are found in large numbers in the skin of rabbit's ears, which are known to be the chief organ of heat regulation in these animals.

Physiologists have written much about the active functioning of the capillaries, but have ignored the glomus, in spite of the much more obvious evidence of its neurological and vascular components, and of its ability to function in response to certain environmental factors.

The blanching of fingers which occurs when the hands are exposed to cold is probably a function of the glomera rather than of the capillaries. In an effort to conserve heat the short circuits provided by the multitude of glomera are wide open so that arteriolar blood is shunted to the venules and returned to the body without flowing through the skin capillaries where it would be brought close to the radiating surface. The principle is similar to that of the thermostat in a car which prevents the water from circulating in the radiator core until the engine is warmed or as long as it is desirable to hold heat in the engine.

The activity of the glomera, rather than capillaries, in this connection is further suggested by the severe pain which accompanies marked cooling of the fingers. Every Canadian school boy is familiar with the phase of severe pain which precedes freezing. He knows that as long as his ears and fingers are hurting they are not

\* From the Department of Surgery, University of Toronto.

frozen, although they are far past the stage of being merely cold. The intense pain which is so characteristic of glomus tumour is exactly similar in kind.

The helpful effects of sympathectomy for the cold painful extremities of Buerger's disease, Raynaud's disease, and arteriosclerosis may readily be due to a beneficial action on glomera rather than on capillaries. The removal of the sympathetic trunk may result in the glomera being thrown into a constricted or tonic state so that the blood to the extremities is not permitted to short circuit but is forced through the capillaries of the skin, which would obviously result in a feeling of warmth and in improved nutrition of the tips of the fingers and toes where gangrene may formerly have been established or impending. There can be no doubt that the interaction between the sympathetic nervous system and the glomera is more obvious than is any association between the sympathetic nervous system and the capillaries. The very anatomy of the glomera demonstrates always an intimate combination of sympathetic nerve fibres, muscular tissue, and vascular spaces. The Horner's syndrome, which often accompanies

glomus tumours on the fingers, cannot fail to remind one of the Horner's syndrome which follows operative interference with the sympathetic nervous system in the region of the stellate ganglion.

Additional evidence of the inter-relationship existing between glomera and the sympathetic nervous system is provided by a study of the disturbed physiology of sweating, which is produced, first, by sympathectomy and, secondly, by glomus tumours. A successful sympathectomy inhibits sweating in the part involved and this phenomenon is admittedly a function of the autonomic nervous system. The disturbed physiology of sweating which is brought about by the presence of a glomus tumour results in the opposite action, namely, profuse sweating, but suggests, nevertheless, a relationship of some sort between glomus tumour and the autonomic nervous system.

Furthermore, since sweating is such an important factor in the control of heat loss of the body, and since the caricature presented by the abnormal glomus suggests a powerful effect on sweating, it does not seem illogical to hypothesize for the normal glomus a function closely associated with loss of heat.

## THE PATHOLOGY OF GLOMUS TUMOURS\*

By A. J. BLANCHARD, M.D.

*Toronto*

IN recent years considerable interest has been centred on the subject of glomus tumours. Although these tumours had been recognized for many years, their essential nature remained obscure. A number of surgeons in the 18th century were apparently familiar with the condition. William Wood,<sup>1</sup> of Edinburgh in 1812 described in detail the clinical picture associated with the tumours and called them "painful subcutaneous tubercles". Later pathological studies are indicated by such names as "Angiosarcoma", "Perithelioma", and "Fibromyomatous angioma" which various investigators applied to them. Modern interest in these tumours dates from 1924 when Masson<sup>2</sup> pointed

out their origin from the cutaneous glomus. A recent case has been reported by Nabarro.<sup>3</sup>

### NORMAL CUTANEOUS GLOMUS

The cutaneous glomus plays an important rôle in the vascular circulation of the skin. In addition to the usual means by which blood passes from arterioles through the capillary bed to venules there is a second mechanism. This consists of a number of specialized arteriovenous anastomoses through which blood is shunted directly from arterioles to venules without the intermediation of capillaries. These specialized channels constitute the cutaneous glomus and they are scattered diffusely in the deeper layers of the true skin and also under the nails. They are not present in new-born infants but begin to appear a few months after birth, becoming fully developed

\* From the Department of Surgical Pathology, Toronto General Hospital, Toronto.

A paper read before the Ontario Association of Pathologists, in Kingston, Ont., September, 1940.



in young adult life and atrophying with age. The size of the glomus is stated to depend on its location. Those of the pad of the toe measure from 120 to 220 microns in diameter and those of the nail bed from 60 to 150 microns in diameter. Popoff,<sup>4</sup> who has made an extensive study of the cutaneous glomus, found in the great toe of a normal 20-year old adult the following number of glomera: ventral surface 18; lateral surface 10; nail bed 24; and nail matrix 12.

The glomus is a skein or conglomeration of small anastomotic channels which is supplied by an afferent arteriole. This afferent arteriole is in turn a branch of a preterminal cutaneous artery. The anastomotic channels rejoin one another to form a collecting venule. Surrounding the skein and running in between the individual channels is a fibrous reticulum in which are a number of non-myelinated nerve fibres and small capillaries. The anastomotic channels differ from the arteriole from which they arise in that they do not possess an internal elastic lamina. They are lined by a single layer of endothelial cells which may be flattened or cuboidal. External to the endothelium, according to some authors, there is an inner circular and outer longitudinal layer of smooth muscle. Others however, deny the existence of muscle fibres. In this external layer are found the so-called "glomus" cells or "epithelioid" cells (Fig. 1). These peculiar cells are fairly large and have rounded, slightly vesicular, nuclei and rather pale staining cytoplasm. Their cell boundaries are indistinct with ordinary hæmatoxylin and eosin stains, but if Van Gieson's or Masson's trichrome stain be used the boundaries are quite evident. The cells then appear round or polyhedral. The exact nature of these cells still remains obscure. By some authors they are regarded as angioblasts while others consider them to be specialized neuromuscular cells.

The function of the glomera has been studied in detail in recent years. In general it may be stated that they probably have important effects in regulating local skin and general body temperature by means of varying the cutaneous blood flow. It is also suggested that they may have some function with regard to maintenance of blood pressure:

## GLOMUS-TUMOUR

In the files of the Department of Surgical Pathology of the Toronto General Hospital are four cases of glomus tumour which, strange to say, all occurred within a period of several months. One of these cases is being reported in detail by Dr. J. H. Couch,<sup>5</sup> and accordingly will be presented here only in abstract. In addition to these four cases a fifth case in which multiple glomus tumours were present on one digit was studied, and this case will be reported by Dr. Burns Plewes.<sup>6</sup>

Although reports in the literature indicate a higher incidence in females, all of these tumours occurred in males, the youngest being 15 years and the oldest 80 years.

### CASE 1

A male, aged 80, had noticed a painful tender swelling in the region of the right external malleolus of the ankle for one year. He stated that the pain was initiated by even as slight pressure as that of a stocking. The tumour was removed locally, and since then the patient has been symptom-free with no evidence of recurrence. The tumour was quite large, measuring 2 x 1 x 1 cm. It was encapsulated and of a reddish yellow colour. On microscopic examination it was found to be a glomus tumour.

### CASE 2

This 43-year old male stated that while receiving a hypodermic injection 18 years previously the needle had broken off in his arm. Although the needle was removed, there had been a rather persistent aching pain at the local site ever since. Lately, however, this pain had become more severe and was accentuated by slight pressure. On examination there was a tender lump the size of a pea on the left upper arm and immediately above this was a fluctuant purplish mass. On aspiration, pure blood was obtained and a clinical diagnosis of hæmangioma was made. The tumour was excised locally. This patient failed to return to the Out-door Department, and so the end-result in this case is not known. The pathological diagnosis was glomus tumour.

### CASE 3

This 41-year old male had noticed a painful subcutaneous nodule on the outer side of the left patella for 2½ years. The lump was quite tender and about 1 cm. in diameter. Local removal completely eliminated the symptoms. This tumour also was a typical glomus tumour.

### CASE 4

This tumour occurred under the finger nail of a 40-year old male. Clinically it presented a problem in diagnosis which is discussed by Dr. Couch. On pathological examination it was found to be a glomus tumour.

## PATHOLOGY

The glomus tumour may be regarded as a benign overgrowth of the normal cutaneous glomus. It reproduces the histological picture of the normal glomus, showing an increased number of vascular channels and a corresponding hyperplasia of glomus cells. The tumours

are single, but they may be multiple, and may occur anywhere in the skin. There is a marked tendency for them to arise in the extremities and particularly under the nails. They appear as rounded or oval small masses usually of pinkish or purple colour, and range in size from 2 mm. in diameter up to that of a Lima bean.

In studying our four cases and the multiple tumours described elsewhere by Dr. Plewes, it is seen that they all possess certain features in common, although there may be fairly marked individual differences. The tumours are surrounded by a fairly definite collagenous capsule, and are composed of a network of vascular

channels simulating those described above in the normal glomus. These channels are lined by a single layer of flattened or slightly swollen endothelial cells, and external to this layer can be seen a varying number of glomus cells (Fig. 2). Some of the vascular channels have a zone of collagenous fibres separating the endothelium from the glomus cells. In some tumours the number of glomus cells is rather small, and the tumours may have an appearance suggesting hæmangioma. In other cases the glomus cells are present in large numbers, and may even grow in dense compact sheets suggesting an epithelial tumour. In these

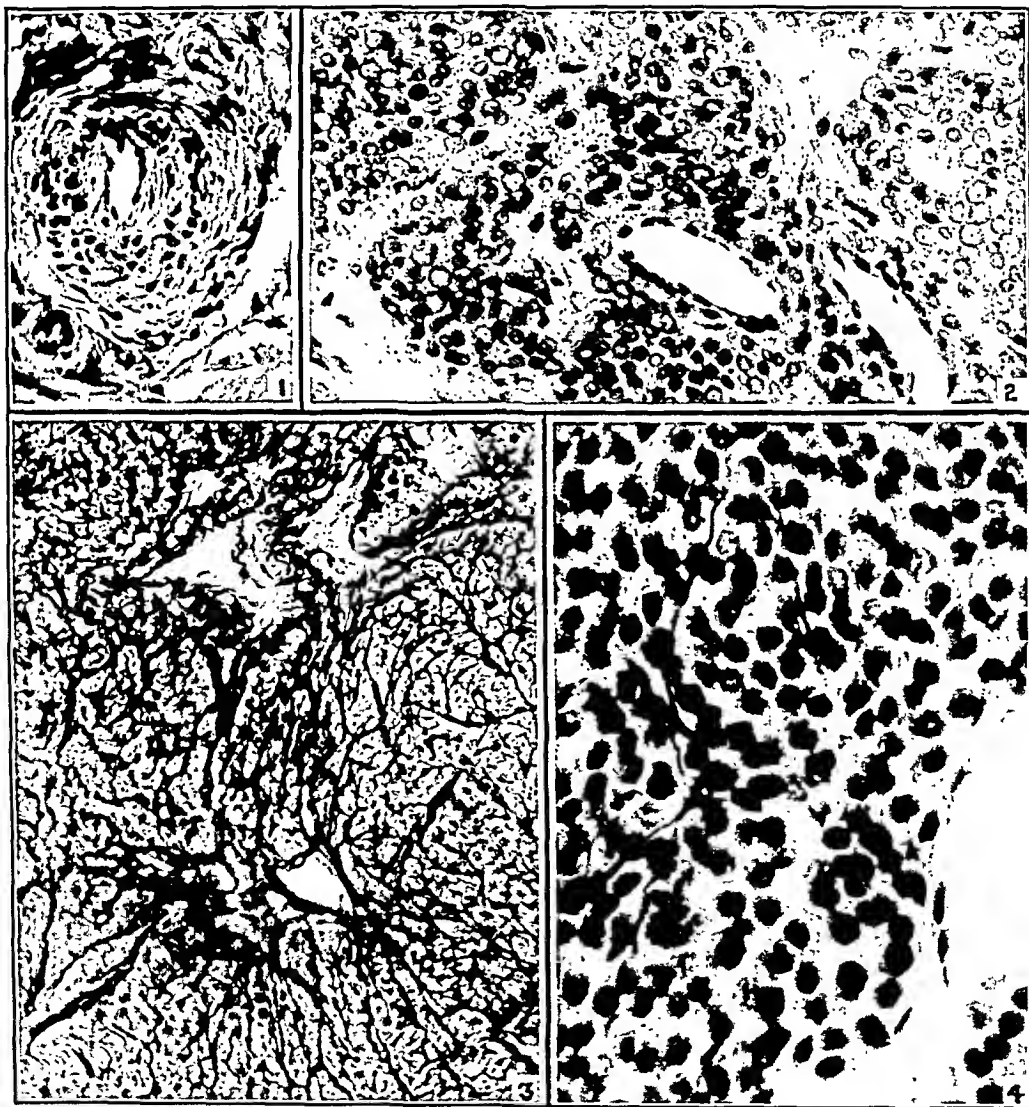


Fig. 1.—Normal cutaneous glomus of skin of finger; hæmatoxylin and eosin (x225). Fig. 2.—Glomus tumour. Note the similarity to the normal glomus and the increased size of the glomus cells; hæmatoxylin and eosin (x225). Fig. 3.—Glomus tumour showing reticulum; Hortega's reticulum stain (x225). Fig. 4.—Glomus tumour showing nerve fibres; Gros-Bielschowski method (x510).

latter cases, however, areas are present where the resemblance to the normal glomus is quite evident. The glomus cells as seen in the tumours are similar to those described above in the normal cutaneous glomus but as a rule they tend to be larger. The tumour cells have round or oval, slightly vesicular, nuclei and an abundant pale or slightly eosinophilic cytoplasm. The cell boundaries are clearly outlined by Van Gieson's or Masson's method, and the cells then have a rounded or polyhedral shape. In our cases there appeared to be no smooth muscle elements in the tumours. There may be considerable mucoid degeneration in the masses of tumour cells.

In the literature on the subject reference is made to the large numbers of nerve fibres which are said to be in the capsule and in the tumour proper. Through the kindness of Dr. Margaret Thompson one of the tumours was studied in detail with this in mind.

Formalin fixed material was used and frozen sections were cut and stained with the Gros-Bielschowski method, the Da Fano modification of the Bielschowski, and the reticulum stains of Hortege and Perdrau. The principle of all of these stains is essentially silver impregnation of fibres. The results obtained have been rather confusing. With the Da Fano technique, which is supposed to stain nerve fibres, and with the Hortege and Perdrau techniques which are considered specific for reticulum an essentially similar picture was obtained (Fig. 3). This consists of a tremendous network of finely branching argentophilic fibres which extends out in a branching radial manner from the vascular channels and penetrates in between the glomus cells. The collagenous fibres of the capsule are outlined as well. Some of these argentophilic fibres have bulbous extremities and some even appear to end in glomus cells. Many of these fibres, however, do not have the appearance typical of nerve fibres, and they appear to be present in too great numbers. A similar picture can be obtained with the Van Gieson stain. It is felt that the majority of these silver impregnated fibres are not nerve fibres but merely the reticulum of the tumour. By means of the Gros-Bielschowski method a rather different appearance is obtained however. The capsule is almost unstained with the exception of a few nuclei of fibroblasts and occasional small thin, elongated fibres which are considered to be nerve fibres. In the tumour proper the dense reticulum is not evident, but a number of fine argentophilic fibrils can be seen running in the loose connective tissue about the vascular channels and also extending in among the tumour cells (Fig. 4). Many of these fibres

have finely branched endings, whereas others terminate in bulbous extremities. Some appear to terminate in tumour cells and others end blindly in the interstitial tissue. These fibres demonstrated by this latter method are considered to be nerve fibres in all probability. A Smith and Quigley stain, which is specific for myelin sheaths, gave a negative result, and accordingly the nerve fibres are thought to be non-myelinated.

#### ETIOLOGY AND PROGNOSIS

In reports in the literature many of the tumours are preceded by a history of trauma as is the second one cited above. This is the only etiological factor recognized, and it is not present in the majority of cases. The tumours are essentially benign and local excision will give a permanent cure.

#### SUMMARY

The structure and function of the normal cutaneous glomus has been reviewed, and the essential benign nature of the glomus tumour has been indicated. Structurally, the glomus tumour consists of a network of endothelium-lined vascular channels surrounded by 'glomus' or 'epithelioid' cells which are supported by a fine collagenous reticulum. The tumours are encapsulated, and in the capsule as well as in the tumour proper are a number of non-myelinated nerve fibres which can best be demonstrated by the Gros-Bielschowski method.

The writer's thanks are tendered to Prof. W. L. Robinson for permission to publish these cases and for valuable suggestions in the preparation of the paper, and also to Prof. E. A. Linell for assistance in interpreting the special stains.

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That the potato is a good substitute for bread as an energy food, but that the protein and mineral salts it provides, with the exception of potash, are less than would be derived from bread, was mentioned in the course of a recent discussion held by the nutrition panel of the Society of Chemical Industry. The potato can act as a satisfactory source of protein for periods up to 300 days in spite of the fact only 50 per cent of the nitrogen-containing substances in this vegetable are protein in nature. Although the vitamin C content of the

potato is relatively low, it is quite an important anti-scorbutic food by reason of the fact that most people eat a fairly substantial quantity every day. The content of vitamin B<sub>1</sub> is of the same order in the potato as it is in bread, and the content of vitamin B<sub>2</sub> compares with that of meat and fish. These vitamins may be partially or completely lost during cooking, according to the method employed. Steaming causes the least destruction of vitamin C.—*J. Roy. Inst. Pub. Health & Hygiene*, 1940, 3: 299.

## PRIMARY CARCINOMA OF THE URETER

BY FREDERICK PILCHER AND D. S. MACNAB

*Calgary*

THE ureter is one of the rarest locations for primary carcinoma. The large number of case reports in recent years suggests that carcinoma of the ureter is being recognized more frequently with modern diagnostic methods which were not widely available nor extensively used twenty-five or more years ago. It is probable that about 1 per cent of carcinoma of the upper urinary tract originate in the ureter.

The first case of primary carcinoma of the ureter was described by Rayer<sup>14</sup> in 1841. The tumour was discovered at autopsy and the diag-

it difficult to evaluate the various statistical studies in regard to the incidence of primary carcinoma. In addition to the cases tabulated by these authors we have been able to find additional 15 cases,<sup>2, 3, 5, 6, 7, 8, 9, 10, 12, 13</sup> which, together with the case herein reviewed, bring the total up to at least 155 cases.

## CASE REPORT

Mr. A.W.B., aged 56, was referred to the Calgary Associate Clinic on March 9, 1938, on account of hæmaturia. Approximately six weeks previously he had developed a pain in the right loin and right side of the abdomen, which was accompanied by leucocytosis and

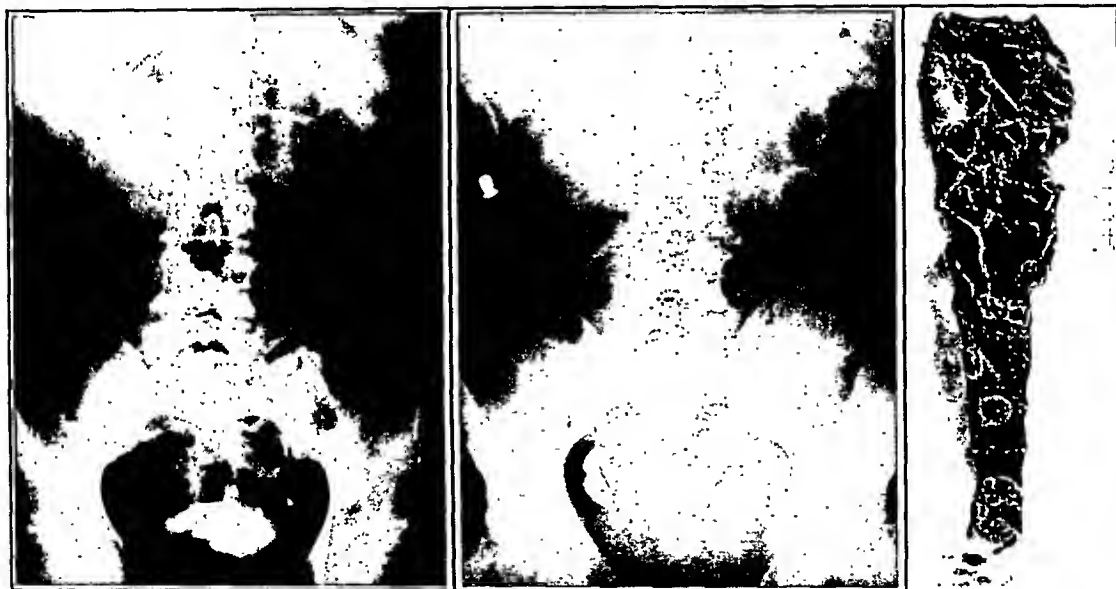


Fig. 1

Fig. 2

Fig. 3

Fig. 1.—Excretory urogram showing a normal left kidney but with no dye appearing on the right. Fig. 2.—Ureterogram showing a filling defect which might be a primary tumour of the ureter. Fig. 3.—Entire right ureter and circular piece of bladder wall and mucosa surrounding the ureteral orifice removed after operation for removal of the right kidney.

nosis was based on gross rather than microscopic examination. In 1878 Wising and Blix<sup>18</sup> reported the first case which was complete with microscopic diagnosis. More recently very thorough reviews of the literature,<sup>1, 11, 15, 16</sup> have been made. The most recent is by Foord and Ferrier,<sup>4</sup> in which the total number of cases of primary carcinoma of the ureter is brought to 139. There is some difference of opinion as to what constitutes a benign and what constitutes a malignant tumour of the ureter. This makes

normal urine. It was thought that he had appendicitis and the appendix was removed. Urinalysis during convalescence was negative. About four weeks after the appendix operation his pain recurred, and this time it was accompanied by gross hæmaturia. An excretory urogram showed no dye in the right kidney and the patient was sent to Calgary for further examination.

An excretory urogram (Fig. 1) made by us on March 9, 1938, showed a normal left kidney and no dye appeared on the right in any of the films. Cystoscopy in the office showed a small tumour projecting from the right ureteral orifice. The patient was sent to the hospital, where cystoscopy was repeated under sacral block anaesthesia on the following day. The tumour protruding from the right ureteral orifice was removed with forceps. A catheter was then passed up the right ureter

and met with an impassable obstruction about 4 cm. from the ureteral orifice. Dye was injected and an ureterogram made (Fig. 2). This showed a filling defect which was thought to be either a primary tumour of the ureter, or an extension down the ureter of a primary tumour of the renal pelvis.

On March 12, 1938, under spinal anaesthesia, the right kidney was exposed through the usual flank incision. It was found to be a thin shell filled with about 900 c.c. of urine and old blood. The ureter was tremendously dilated. Palpation of the ureter showed a tumour mass in the ureter at about the brim of the pelvis. The ureter was clamped, cut, and ligated above this mass and the kidney removed. Unfortunately the specimen was lost later, and a photograph is not available. The kidney was a mere hydronephrotic shell and the mucosa of the pelvis and upper ureter was entirely free from tumour. Convalescence was uneventful.

On March 25, 1938, under spinal anaesthesia, the right ureter was exposed extraperitoneally through a Gibson incision. The entire ureter was removed and with it a circular piece of bladder wall and mucosa surrounding the ureteral orifice about 3 cm. in diameter (Fig. 3). The opening in the bladder was closed in two layers and a catheter placed in the urethra for drainage. Convalescence was uneventful. Microscopic examination of the tumour was made by Dr. A. C. Broders who reported it a grade-2 carcinoma.

Follow-up cystoscopy on August 6, 1938, and January 19, 1939, showed no tumour in the bladder. On November 20, 1939, cystoscopy revealed two small papillomas in the base and posterior wall of the bladder. These were destroyed in the office by electrocoagulation. Cystoscopy again on May 20, 1940, showed no further recurrence and abdominal examination revealed no suspicion of metastases.

According to the literature the average age for primary tumours of the ureter is about fifty-five years. Most of the cases occur in the fifth, sixth, and seventh decades. Cases are reported in persons as young as the early thirties. The distribution between the two sexes is about equal.

**Symptoms.**—The outstanding symptoms are hæmaturia, pain, and tumour. According to Foord and Ferrier<sup>4</sup> blood was noted in at least 70 per cent of the patients. Pain was present in 60 per cent and varied in duration from a few weeks to several years. The pain is usually a dull ache in the kidney region, or a typical colicky ureteral pain. The pain due to local invasion or metastases depends on the structure involved. The character of the urine will depend on whether the tumour is bleeding at the time of examination, and whether infection has taken place. Infection generally occurs sooner or later in the majority of cases, and accordingly may alter the clinical picture. The tumour mass noted is generally the hydronephrotic kidney; very rarely has the ureteral tumour itself been palpated.

**Diagnosis.**—There is only one pathognomonic sign of ureteral tumour and that is the demonstration of a filling defect in the ureterogram. The difficulty of demonstrating such a filling

defect is very great, less than 10 per cent of the reported cases having this positive evidence. Actually, very few of the earlier reported cases were diagnosed before operation, but the incidence of preoperative diagnoses has increased considerably in those reported later. Cystoscopic examination may show a bloody spurt from the affected side. In about a third of the cases a tumour may be seen projecting from the ureteral orifice. The appearance time and concentration of indigo carmine from the affected side will depend on the degree of ureteral obstruction produced by the tumour. Obstruction to the passage of a catheter in a ureter from which bleeding occurs is very suggestive of tumour. In probably half of the cases there is a complete ureteral block and no bougie or catheter will pass the tumour.

The plain x-ray, or scout, film may show an enlarged kidney shadow due to the associated hydronephrosis. Coincidental stones might be observed. The excretory urogram usually shows no excretion of dye on the affected side because of the interference of kidney function by the obstructing growth. A hydronephrotic or even normal kidney may show on the affected side. Rarely does the excretory urogram show the filling defect in the ureter. A catheter must be passed, or at least its tip engaged in the ureteral orifice, so that the ureter might be filled sufficiently to show the defect. The filling defect should be constant in repeated films, in order to avoid error due to blood clot or non-opaque stone.

It is possible to have a tumour so small that it cannot be demonstrated. For other reasons the tumour might be overlooked. If the kidney has been removed because of hæmaturia and it does not show adequate cause for the hæmaturia, then the ureter should be removed. If bleeding occurs from the stump of the ureter after nephrectomy the entire ureter had better be removed.

**Pathology.**—About two-thirds of the primary ureteral tumours occur in the lower third of the ureter. Only a very few occur in the upper third. Ureteral tumours originate from a type of epithelium similar to bladder epithelium, and the general character of these resembles that of bladder tumours in microscopic appearance as well as in the clinical course of the disease. There are marked differences in the terminology used by different authors, and

nearly every pathologist has a different system for classifying and grading the degree of malignancy in ureteral tumours. Bladder tumours, considered by many as benign papillomas, are thought by others to possess a low degree of malignancy. For that reason all primary ureteral tumours probably should be considered malignant. Primary ureteral tumours show the same histological character and degrees of malignancy as do bladder tumours. Because of the large percentage of cases showing metastases at operation or autopsy and because of the very poor end-results this is at least suggestive that ureteral tumours possess on the average a higher degree of malignancy than bladder tumours. Of course, the relatively late diagnosis in many cases may be responsible for the poor ultimate results.

**Prognosis.**—A large majority of those who survive the operation die within two years, generally with local recurrence or metastases. Scott<sup>17</sup> made a careful follow-up study of the cases in the literature and found only two patients alive after five years.

**Treatment.**—The accepted treatment is nephro-ureterectomy, with the removal of a portion of the entire bladder wall where the ureter goes through the bladder. The operation may be done in one or two stages. Foord and Ferrier<sup>4</sup> report a mortality rate of 40 per cent in one-stage nephro-ureterectomies and only 5 per cent in two-stage nephro-ureterectomies. In our case the kidney was removed first and the ureter later, but it has been suggested by Dr. Hugh Cabot that the lower segment of the ureter containing the tumour together with a cuff of bladder mucosa should be removed first and the upper end of the ureter brought out to the skin, as with cutaneous ureterostomy. Later the kidney may be removed with the attached portion of the ureter. If the ureter is removed first then the source of danger is removed, whereas if the kidney is removed first, some unforeseen complication may delay indefinitely, removal of the lower segment of the ureter containing the tumour. Pre-operative and post-operative radiation are probably of considerable value.

Every patient who has an ureteral tumour should have regular routine follow-up cystoscopies, as is done ordinarily in cases of bladder tumour. The same etiological agent which was responsible for the tumour in the ureteral

mucosa may later cause one in the histologically similar bladder mucosa. Frequent cystoscopies will disclose such tumours when they are small and can be destroyed satisfactorily by cystoscopic fulguration.

#### SUMMARY

The literature of primary carcinoma of the ureter is reviewed thoroughly, and a personal case is given in detail.

The chief symptoms are hæmaturia, pain, and mass.

The only pathognomonic sign is a filling-defect in the ureterogram. Suspicion of primary ureteral tumour is aroused by unexplained bleeding from an ureteral stump, or impassable obstruction to a catheter in a ureter from which bleeding occurs. In about a third of the cases a tumour projects from the ureteral orifice.

Ureteral tumours resemble bladder tumours histologically and in their clinical course. All ureteral tumours should be considered malignant.

The treatment of primary carcinoma of the ureter is complete nephro-ureterectomy, preferably done in two stages, with removal of the lower tumour-containing ureteral segment first, followed later by removal of the kidney.

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## MULTIPLE GLOMUS TUMOURS: FOUR IN ONE FINGER TIP

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NEURO-MYO-ARTERIAL glomus tumour is a rarity, reports in the literature totalling less than 100 cases. More than one tumour of this type in one patient is still less frequent, only 5 such cases being found.

Four glomus tumours in one forearm was reported by Adair<sup>1</sup> in 1934. Stout's<sup>2</sup> series of glomus tumours included a case with two tumours around the heel of one patient, and another who had a second tumour removed from the fifth finger eight years after the removal of the first and relief of symptoms. Bergstrand<sup>3</sup> observed and operated upon two cases of multiple glomus tumours involving the postero-lateral aspect of the foot and malleolar region. One of these had obtained only partial relief by undergoing in succession periarterial sympathectomy and amputation, but was completely relieved by two operations for the removal of six tumours. The other patient had four tumours involving the bones of the posterior foot so that the radiographic pictures suggested multilocular cysts. These cases were so similar that Bergstrand suggested that they might be examples of a distinct clinical entity.

None of the reports showed evidence that multiplicity of the glomus tumour gave rise to any peculiarly different or more severe symptoms. Nor has any clinical or pathological evidence of malignancy been demonstrated. It is suggested that the rare case of recurrence may well have been a case of multiple glomus tumours, the second tumour being very small at the time of the first operation.

Many of the characteristics of glomus tumours are illustrated by the following case. It represents the first definite case of multiple glomus tumours of the finger (the most common site for single tumours) which the author has been able to find recorded.

## CASE REPORT

The patient, a youth of 16 years, had spent his childhood in the Orient, his parents being Canadians of British origin. The only previous illnesses were asthmatic attacks, probably due to allergy, when a baby.

As early as ten years ago the patient had complained of pain in the little finger of the right hand when bathing in cold sea water. For about seven years there had been pain and tenderness in the tip of this digit. For five years, atrophy, intermittent

discoloration, and excessive sweating of the whole finger had been noticeable. During the past two years he and others had been able to palpate a lump in the palmar aspect of the finger tip, such palpation bringing on severe prolonged pain. He thought his trouble was related to a slight accident when he had cut the base of this finger with glass. The appearance of a lump was interpreted as the migration of a bit of glass from the site of the old, half-forgotten scratch. But many examinations by doctors had failed to reveal any tumour previous to this time. X-ray plates, taken a year before, failed to reveal any abnormality or foreign body. Pain radiating from the finger tip up the forearm to the elbow was brought on by striking or palpating the pulp of the finger tip, by vibration (as by riding his bicycle with his hand firmly on the grip), or by changes in temperature. Immersion in cold water, winter weather, and occasionally hot water, would also bring on attacks of gradual onset which were so severe that the pain would spread "like a chilly sickness" over his whole body and sometimes make him "yelp with pain". It would take from half an hour to half a day for him to recover from a severe pain. The patient was abnormally careful to wear lined gloves or mitts. The tenderness became a greater problem recently when he began to take an interest in playing the piano, for though he could hit the keys with the affected finger, touching the side of the adjacent key might cause sharp pain. He found no relief except in the protection of his finger from contacts, blows and changes in temperature.

*Examination.*—No abnormalities were found in this well-developed intelligent youth except those of the right fifth finger. The latter was definitely smaller and thinner than its fellow of the left hand. The skin was dusky, almost cyanosed. Beads of sweat were noted on its palmar surface but not on the other fingers. On the ulnar aspect near the tip a tiny elevated darker reddened spot formed a round elevation of smooth skin. This varied in colour from time to time, sometimes appearing almost transparent. Pressure over this little lump caused very severe pain which did not radiate. A larger tumour could be palpated, but not seen, in the midline of the finger in front of the middle of the terminal phalanx, and was nearly half a centimetre in diameter. Pressure over this firm lump brought on severe pain radiating up to the elbow and a generalized feeling of sickness and faintness. A diagnosis of neuro-myo-arterial glomus tumour was made and operative removal advised.

*Operation.*—Toronto East General Hospital, April 13, 1940. With novocaine finger block and tourniquet, a longitudinal ellipse of skin was removed from the ulnar aspect of the finger so as to include the small visible tumour. The palmar margin of this wound was then retracted toward the larger midline mass. As dissection proceeded a very small, but distinct, encapsulated, pale, grayish, rubbery hard tumour was found and removed. It was too small to have been palpable. The larger midline tumour was then exposed and had the same appearance. A leash of tiny blood vessels formed a pedicle which was ligated before it was easily removed. Having thus found three tumours, further palpation revealed a fourth beside the ulnar aspect of the root of the finger-nail. This was about 3 mm. in diameter, encapsulated and with a pedicle. The tourniquet was removed and profuse bleeding, probably from the pedicle of the tumour removed with the skin, controlled. The skin was closed with fine silk.

*Progress.*—The wound healed satisfactorily. In nine days, when the stitches were taken out, there was still marked local tenderness. Improvement since then has been steady though four months after operation there are still a few modified signs and symptoms present. The patient says he is still definitely improving. The discoloration has gone, but the finger looks small and atrophied, and sweats more than the rest of the hand. Under ordinary circumstances of using the finger and immersion in cold water there is now no pain. Riding his bicycle is not now a cause of pain. But intentional pressure by palpation over the proximal end of the scar still causes slight local pain and a perceptible "sickness in the stomach" which may last three minutes.

*Pathological report* (Dr. G. F. Laughlen).—The specimen consists of three spherical nodules, 4 mm., 3 mm. and 1.5 mm. in diameter, and a segment of skin and subcutaneous tissue, 1.5 mm. thick. In the subcutaneous tissue is a tiny nodule measuring less than 1 mm. in diameter. All four tumours present similar characteristics: encapsulated, of medium firm rather elastic consistency, pale yellowish brown in colour both on their outer and cut surfaces.

Microscopically, tumour cells are arranged in clusters separated by bands of connective tissue and vascular spaces, which are large and prominent. The tumour cells are spheroidal in shape, somewhat larger than polymorphonuclear leukocytes, have acidophilic cytoplasm, and their nuclei are large and often reticulated. Connective-tissue cells are sometimes dense and fibrillar, sometimes myxomatous. All four of the tumours are similar in structure and lie below the skin, not attached to it. There is an absence of inflammatory reaction.

*Diagnosis.*—Glomus tumours (multiple).

A photomicrograph of one of these tumours may be seen in the second illustration of Dr. Blanchard's paper.

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## THE ETIOLOGY OF SYDENHAM'S CHOREA: ELECTROENCEPHALOGRAPHIC STUDIES\*

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SYDENHAM'S chorea has been generally considered as part of the syndrome of rheumatic fever. The precise rôle of the rheumatic process in the etiology of chorea is, however, not clear. Pure chorea, that is, chorea without any of the usual manifestations of rheumatic fever (joint pains, nodules, repeated sore throats, and heart disease), is rarely followed by heart disease.<sup>1,2</sup> According to Findlay<sup>3</sup> "Either all cases of Sydenham's chorea are not rheumatic in origin or different strains of the rheumatic virus are responsible for the two manifestations". Gerstley and his associates<sup>4</sup> came to the conclusion that "chorea should not be taken as an indication of rheumatic infection without other rheumatic manifestations."

Pathological studies of patients with chorea are meagre, since the patients usually recover. The evidence available shows a gross picture similar to that observed in any acute infectious disease with degenerative changes, especially in the locus niger, neostriatum, and corpus subthalamicum, but cortical cells have been found

severely altered in some cases.<sup>5</sup> It seems clear that chorea and rheumatic fever are associated with generalized and non-specific lesions of the brain with degenerative changes more marked but not confined to basal ganglia.<sup>6</sup> Certainly no specific local lesion has been shown to be responsible for the symptoms of chorea.

As a technique for the detection and localization of abnormalities of cerebral function electroencephalography has made rapid strides toward becoming a practical clinical tool.<sup>7 to 12</sup> Local degenerative lesions of the brain caused by neoplasm, trauma, etc., cause abnormal waves to appear in the electroencephalogram in their immediate vicinity.<sup>13, 14</sup> Generalized brain damage, such as may be produced by severe concussion, causes slow waves to appear from all parts of the brain. The slow waves disappear with clinical recovery of the patient.<sup>14</sup> In the epilepsies, milder forms of the same kind of abnormality seen in attacks may be recorded in the electroencephalogram taken between clinical attacks. Also many of the close relatives of patients with idiopathic epilepsy show similar abnormalities in the electroencephalogram.<sup>15</sup> Severe behaviour problem children<sup>16</sup> and constitutionally inferior children<sup>17</sup> show a high percentage of cases with abnormal electro-

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encephalograms. Patients with purely psychogenic disorders show normal electroencephalograms.

Abnormality in the electroencephalogram is a sign of functional abnormality of the brain, either as a result of acute inflammatory or degenerative processes or, in some cases, apparently due to some developmental defect which may have some basis in heredity. Consequently, some valuable information should be gained by the application of this new technique to the study of Sydenham's chorea, a disease of uncertain etiology and pathology.

#### CLINICAL MATERIAL

Most of the children studied were from the Rheumatic Pavilion of the Children's Memorial Hospital of Montreal; a few were from the Royal Victoria Hospital. There were 23 chorea patients most of whom were studied for a period of over 18 months. In addition, 7 cases of questionable chorea were examined. We were able to obtain electroencephalograms on one patient with active rheumatic fever without chorea and one with rheumatic carditis and no chorea. Electroencephalograms from 48 children of comparable ages were used as controls. In addition, there were available for comparison the electroencephalograms from over two thousand patients of various kinds examined in the Department of Electroencephalography of the Montreal Neurological Institute.

#### TECHNIQUE

Electroencephalograms were taken by the usual method, using ink-writing recorders and standard placements of electrodes as described elsewhere.<sup>14</sup> Records were taken from frontal, central, parietal and occipital head regions with both bipolar and monopolar leads in all cases. In certain cases special localization studies were carried out as well. The patients were examined in a dimly lighted sound proof room separate from the recording equipment. A specially trained nurse was in constant attendance to signal on the record all movements of the patient as a control against movement artifacts which might be confused with electrical disturbance of brain origin.

#### ANALYSIS OF DATA

Definite abnormalities of brain function were revealed in the electroencephalograms of all patients with severe chorea at the time of

examination and in many when examined at a time when choreiform movements were not pronounced. There were three patients with mild active chorea who showed minimal abnormality in the electroencephalogram, appearing more marked when recording from deeper lying brain areas (monopolar leads from the ear lobes to the scalp surface) than when recording only superficial cortical activity (bipolar leads 3 to 5 cm. apart on the scalp surface). Since the records in these cases were not markedly different from the most extreme of the normal controls they were considered borderline or questionably normal.

In general the electroencephalographic abnormalities consisted of a decrease in the amount of normal ten per second alpha rhythm with larger amplitude slow waves (delta) in its place. In the most severe cases the normal alpha was completely absent, with slow waves between 1 and 6 per second occupying the entire record. Careful controls have served to rule out the possibility that these waves were due to movement artifacts. The degree of abnormality in a given record was indicated by the extent of which normal waves were absent and by the amount of slow wave activity present. In certain records, all from patients with mild chorea, there was some normal alpha superimposed upon random delta waves, especially with monopolar leads recording from deeper lying parts of the brain.

No strictly localized abnormality was found in any case. In the milder cases subcortical regions seemed more involved than superficial areas of the cortex and more abnormality was recorded from anterior than from posterior areas but no discrete focus of abnormal waves was detected. In all severe cases the entire brain seemed involved due to the complete absence of normal rhythms and the presence of slow waves from all regions of the head.

#### CASES WITH BORDERLINE ABNORMALITY IN THE ELECTROENCEPHALOGRAM

There were three cases who had borderline or questionably abnormal electroencephalograms and mild chorea. R.W. was a girl of 8 years with mild pure chorea in her first attack which subsided rapidly after admission. A.C., a boy of 12 years, was also a case of mild pure chorea in the first attack which subsided rapidly with bed rest. There has been no recurrence for over a year

following discharge in either of the above two cases. R.H. was a boy of 9 years with mild chorea associated with acute rheumatic fever and acute carditis, erythema and nodules. He is a recent admission still under observation in the hospital. Abnormality was definite only with monopolar leads in this case.

Three emotionally unstable children, with occasional twitching movements of the extremities, in whom the diagnosis of chorea was in doubt, were examined. The electroencephalogram in all of these patients showed borderline abnormalities illustrated by one case, J.R. in Fig. 1. These records could not be distinguished from those obtained in the three patients with definite mild chorea.

#### RELATION BETWEEN CLINICAL IMPROVEMENT AND THE ELECTROENCEPHALOGRAM

In cases studied over a sufficiently long period of time there was a marked parallelism between the clinical status and the degree of abnormality observed in the electroencephalogram. The best example was that of N.B., a girl of 8 years with severe chorea. It was her first attack. There was a history of joint pains and the presence of an apical systolic murmur. She was kept in the hospital for five months. On admission the electroencephalogram was quite abnormal as shown in the first line of Fig. 2A. At the end of the first month in the hospital there was marked clinical improvement and the electroencephalogram taken at this time showed marked improvement approaching a normal record (second line, Fig. 2A). Six weeks after discharge from the hospital there was recurrence of chorea, and another electroencephalogram taken at this time showed a return of the abnormality (third line, Fig. 2A). Her clinical course has been uneven since discharge over a year ago, there being an occasional recurrence of mild chorea.

There were two other cases with a marked parallel between clinical recovery and a decrease in the abnormality of the electroencephalogram. One was a boy of 5 years with severe chorea and a history of rheumatic fever six months previous (R.V., Fig. 2B) and the other a girl of 10 years with moderately severe chorea, her first attack, and a history of joint pains and presence of mitral and aortic heart disease (J.T., Fig. 2B). The boy with most severe chorea showed marked improvement in the electroencephalogram taken four months later when there were no clinical signs of active chorea. It

should be noted that abnormality had not completely disappeared from the electroencephalogram at this time. In the girl with less severe chorea there was less abnormality in the electroencephalogram at the height of her disease, and more complete recovery was shown three months later when clinical symptoms were absent (J.T., last record, Fig. 2B). Both of these patients have done well since discharge over a year ago.

There were 6 cases with very marked abnormality in the electroencephalogram which showed very little improvement when repeated six months later. All were girls, ages 5 to 14, with severe prolonged chorea. Two had recurrence of severe attacks during a prolonged stay in the hospital. One had a history of four previous attacks in 7 years, and another had had one previous attack. Only two of these six patients had a history of joint pains and showed evidence of heart disease. The electroencephalogram from one of the most severe and protracted cases is shown in Fig. 4. She was a girl of 8 years observed during her first attack of chorea which was very severe, but there was no other evidence of rheumatic disease. She was 16 months in the hospital, during which time there were two exacerbations of her clinical symptoms. Three electroencephalographic examinations taken during this time showed such persistent and severe abnormality that a pneumoencephalogram was done, but the ventricular system was considered within normal limits. After discharge there was slow gradual improvement. Thirteen months later another electroencephalogram was taken which showed definite improvement but considerable residual abnormality still present (last line of Fig. 4). At this time there was no clinical evidence of chorea but there was definite mental retardation. A fair adjustment was being made in school by attending a special class.

It seems that, during recovery from a severe attack of chorea the electroencephalogram may return to normal somewhat slower than the usual clinical signs of active chorea.

In all of the cases studied over the past two years there has been only one mild recurrence where the electroencephalogram has shown marked improvement or return to normal. On the other hand, in those cases in which the electroencephalogram has shown severe abnormality and little or no improvement upon repeated examination the chorea has remained

protracted and severe or has recurred. It appears that this new method of examination may be of value in prognosis comparable to the sedimentation test in rheumatic fever.<sup>28</sup>

**Hemichorea.**—In three children the clinical manifestations of chorea first involved only one side of the body before becoming generalized as the chorea became more severe. In all three cases the electroencephalogram at the onset showed greater abnormality from the contralateral hemisphere. Later records showed about the same degree of abnormality from the two sides and the choreiform movements were then present also from the two sides.

#### THE ELECTROENCEPHALOGRAM IN SIBLINGS OF CHOREA PATIENTS

Electroencephalograms were taken of the siblings of chorea patients in two different families, 5 in one and 2 in another. Sample records from the L. family are shown in Fig. 3. This was a poor French Canadian family with 10 children, 3 with chorea. The patient was a girl of 6 years who had had an attack of chorea the year before. Both attacks were severe and prolonged. Very marked abnormality was present in the electroencephalogram taken during the second attack, and persisted until the time of discharge even though there was some clinical improvement.

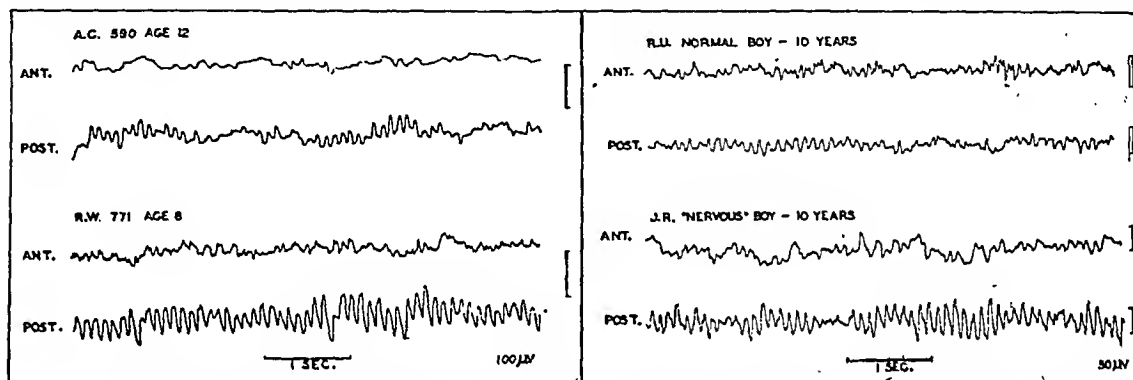


Fig. 1.—“Borderline” and normal electroencephalograms taken with bipolar leads (two electrodes 5 cm. apart on the scalp) over anterior and posterior head regions. The two pairs of records on the left were taken from two cases of mild chorea, A.C. and R.W., described in the text. The third pair of records was taken from a normal boy (R.U.) aged 10. The fourth pair of records was from a “nervous boy” (J.R.) who was submitted for diagnosis of questionable chorea. Note the normal ten per second alpha rhythm in the lower line of each pair. The amount of slow wave activity in the bipolar records of the two patients with mild chorea was not considered definitely abnormal.

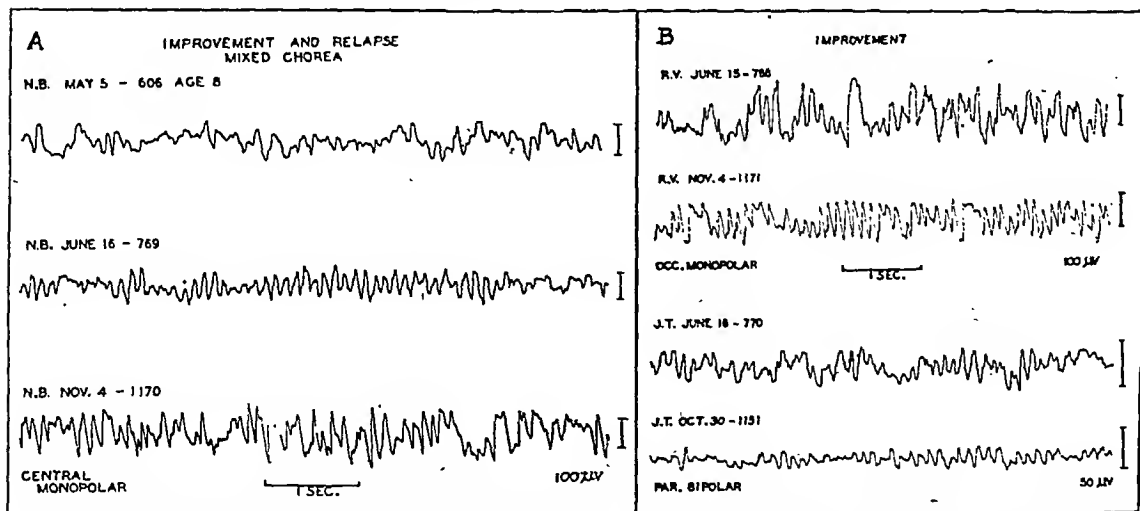


Fig. 2.—Improvement in E.E.G. with clinical improvement. A—case N.B. (see text) showing monopolar E.E.G. from the central head region above during an attack of clinical chorea May 5th and when she was clinically quite well about six weeks later, June 16th. Note the absence of normal alpha rhythm in the upper record with irregular slow waves in its place. In the second record the slow waves are almost completely absent and there is a good normal alpha rhythm. Five months later there was a recurrence of chorea and the E.E.G. (lower line) showed irregular slow waves with only traces of normal alpha rhythm. B—case R.V., fourth and fifth lines and Case J.T. in the last two lines shows two other examples of improvement in the E.E.G. parallel with clinical improvement (see text).

Electroencephalograms from five of the siblings of this patient all showed definite dysrhythmia, especially from the frontal lobes, but present in records from all head regions (Fig. 3). The abnormality was much less severe than that found in the patient but of the same general character. It was even more marked in these

siblings, ages 8, 9, and 12, who had no history of chorea than in the other two, ages 14 and 16, who had a history of chorea in their pre-adolescent years.

In the second family there were 8 children only 3 of whom we had the opportunity to examine (including the patient). The patient,

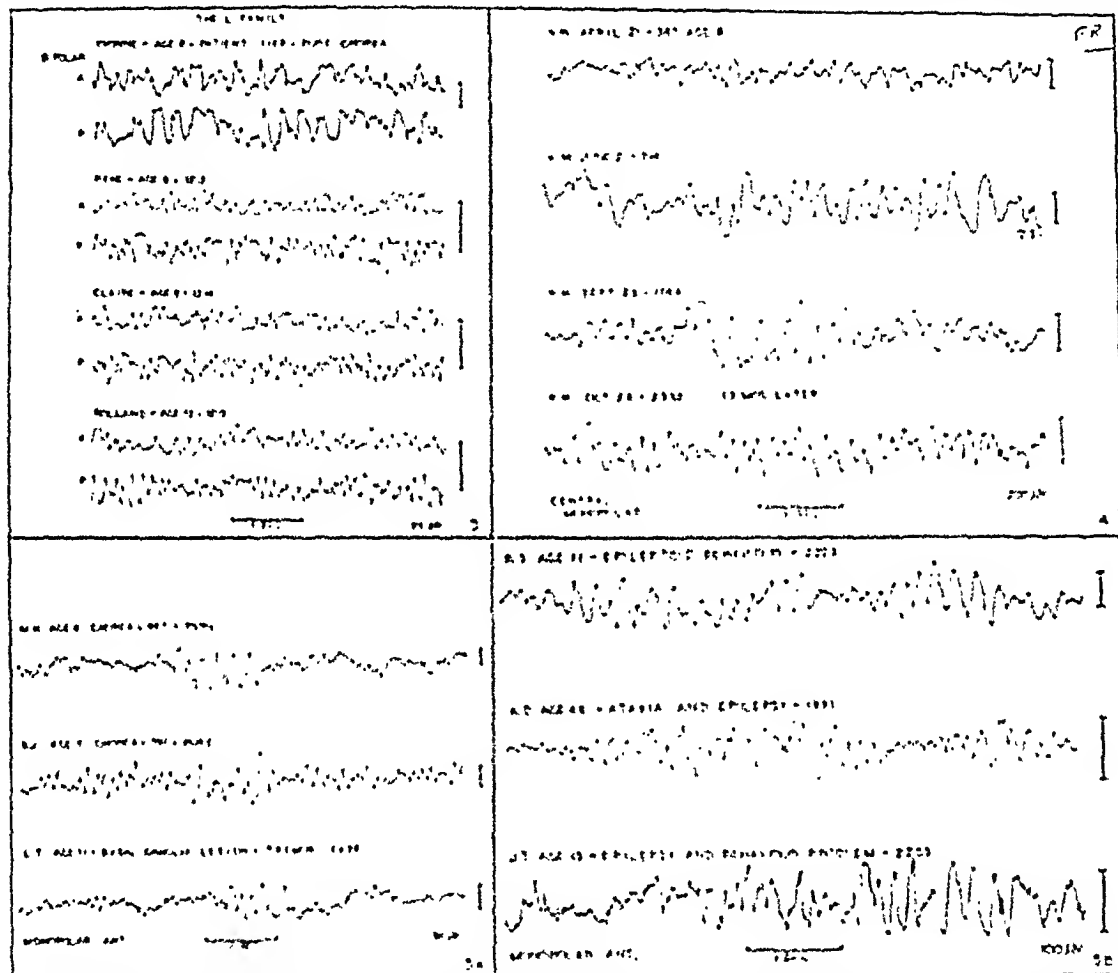


FIG. 3.—Mild dysrhythmia in L.E.G. of siblings of chorea patient in the L. family (see text). Records are from bipolar leads in anterior (A) and posterior (P) head regions in each case. The upper pair of records were from the patient Yvonne during an acute attack of chorea showing severe dysrhythmia with irregular slow waves and absence of normal rhythm from all head regions. The lower three pairs of records were from siblings, Rose, Claire, and Rolland, all showing definite, though less severe, slow dysrhythmia especially marked in anterior lead regions. None of these three siblings had a history of chorea or rheumatic disease. FIG. 4.—Severe abnormality in L.E.G. showing little improvement. Sample records are from the case of V.W., who was examined over a period of 18 months (see text). The first three records taken in April, June and September of 1939 showed no normal activity from any head region and only the large amplitude slow waves as indicated. There was occasionally a prominent 6 per second rhythm and slower random delta waves. The last record taken in October, 1940, showed some diminution of delta wave activity with some rhythm just below 7 per second which might be a slow alpha rhythm. Clinical progress was slow, marked by recurrence of symptoms and incomplete remission. FIG. 5.—Dysrhythmia of chorea and certain epilepsies. A.—Case M.H., upper line, was a girl aged 6, who first had hemichorea which later became generalized. The L.E.G. showed maximum abnormality at first from the contralateral hemisphere then equally from both sides in a later examination after the movements had become generalized. Case B.J., second line, was a girl aged 7 with mild generalized chorea and with history of epileptic convulsions up to the age of five years (with an epileptic father). The third case, L.T., aged 11, was a boy with a definite lesion of the basal ganglia revealed in the pneumoencephalogram (possible, some cortical atrophy as well), with marked continuous tremor of the right hand, and L.E.G. resembling some found in chorea patients. D.—The fourth case H.S., aged 11, was a severe behaviour problem boy with episodic outbursts considered epileptoid. The fifth was a man of 46 years with ataxia and epilepsy, and the sixth, a girl of 13 years with epilepsy and episodes of intractable behaviour. The last four records were selected as showing dysrhythmia among those similar to that found in chorea patients.

J.S., a girl of 6 years, had a moderately severe recurrent chorea with a history of joint pains and is still under observation in the hospital. The electroencephalogram at the onset of her illness was very abnormal but showed definite improvement when repeated two months later when the clinical symptoms had subsided. Her two brothers, aged 3 years and 5 years, both showed a moderate degree of abnormality in the electroencephalogram of the same type, but much less severe than that of the patient. They had no history of chorea.

#### THE ELECTROENCEPHALOGRAM IN RHEUMATIC FEVER WITHOUT CHOREA

It has been possible thus far to obtain only one electroencephalogram in acute rheumatic fever without chorea, a boy of 7 years on whom the electroencephalogram was taken three weeks following the acute onset after most symptoms had subsided. There was considerable elevation of the sedimentation rate, but there was no evidence of carditis. The abnormalities in the electroencephalogram resembled those obtained in a case of moderately severe chorea. The boy was bright and very active, with no choreiform movements. It will be of interest to follow this case in view of the possible later development of these symptoms.

The electroencephalogram from a case of chronic rheumatic heart disease of three years' duration with progressive cardiac enlargement did not show the abnormalities of chorea, but had, for the most part, a completely normal record. There was an occasional slowing of the normal rhythms such as might be occasioned by periodic circulatory deficiency.

#### RELATION WITH DYSRHYTHMIA OF EPILEPSY AND OTHER CEREBRAL DISORDERS

Some of the abnormalities found in the records from chorea patients bear a close resemblance to those described in certain types of epilepsy.<sup>19, 20</sup> There is also some resemblance to the generalized abnormalities found in acute head injury.<sup>14</sup> A rather striking similarity was found in the electroencephalogram of a boy of 11 with a definite lesion of the basal ganglia (with possibly also some cortical atrophy) revealed in the pneumoencephalogram who had a continuous coarse tremor of the right hand. Certain of these similarities are illustrated in Fig. 5. It cannot be said, therefore, that there is a specific form of electroencephalographic abnormality in chorea.

When specific wave forms are considered the electroencephalogram in chorea does not bear a very close resemblance to that of epilepsy, since none of the wave forms most characteristic of the epilepsies (random spikes, the three per second wave and spike pattern, etc.<sup>20</sup>) have been observed in chorea. Also the large amplitude discharges observed during an epileptic attack have not been observed even during the most severe attack of chorea. The generalized slow rhythms of chorea and those found in certain epileptic patients are probably related to a non-specific damage of cortical tissue in the two conditions. It is suggestive that in one case of severe chorea whose electroencephalogram most resembled certain kinds of epilepsy there was a history of convulsions until five years of age and the father was epileptic. The exact relationship between chorea and epilepsy in view of these findings bears further study.

#### DISCUSSION

There can be little doubt that a severe and generalized abnormality of cerebral function is involved in all severe cases of Sydenham's chorea, with or without the usual manifestations of rheumatic fever. This argues against the importance of psychogenic factors, at least in severe cases. We have been unable to differentiate between the electroencephalograms in pure and in mixed chorea. This may be considered evidence for a similar affection of the brain in either case. That a similar form of abnormality may be present to a moderate degree in acute rheumatic fever without chorea (one case) suggests an encephalitic aspect to this disease which may account for its frequent association with chorea.

In the diagnosis of questionable chorea a positive electroencephalogram would suggest definite chorea, but a borderline or negative electroencephalogram would not rule out mild chorea, since the amount of abnormality in very mild cases is so slight as to be often passed as within normal limits. However, during the recovery from severe chorea, fairly marked abnormality may persist in the electroencephalogram after the obvious signs of chorea have disappeared. This is similar to the findings of Jäspér, Kershman and Elvidge<sup>14</sup> in cases of severe head injury. It might be related also to the fact that characteristic epileptiform waves may be observed in the electroencephalogram from epileptic patients even between clinical attacks.

when there are no apparent clinical symptoms.

The fact that the siblings of certain chorea patients tend to show a similar disorder in the electroencephalogram is evidence for hereditary predisposition in some cases. Read, Ciccio and Taussig,<sup>21</sup> in a study of 33 children attending their cardiac clinic, found a significantly greater incidence than in the corresponding relatives of 33 control children. Hereditary predisposition must therefore be considered an important factor in the etiology of chorea, but it is not proved that all cases of chorea are vulnerable on this basis alone. The fact that the electroencephalogram in some cases may return completely to normal following clinical recovery suggests that an acute, probably reversible, process is the principle etiological agent in many cases with no evidence for hereditary defect. Heredity may still be important in determining that the symptoms should be those of chorea rather than some other nervous disease.

By analogy with the epilepsies we would agree with Gerstley<sup>4</sup> in the conclusion that chorea is a "clinical syndrome rather than a disease entity". Rheumatic fever is not the only cause, though a frequent one, and hereditary predisposition plays an important rôle in this as in many other diseases of the brain which do not have their immediate cause in hereditary maldevelopment. Like epilepsy, chorea is a symptom of damage to certain parts of the brain which may arise from a variety of etiological agents.

### SUMMARY

Electroencephalographic and clinical observations on 23 children with Sydenham's chorea, many observed for over two years, have been reported and discussed. The principal findings were as follows:

1. In all cases of severe chorea severe generalized abnormalities were observed in the electroencephalogram. These consisted of a decrease or absence of normal alpha rhythms and the presence of continuous delta or slow wave activity of increased amplitude.

2. Three cases with mild chorea showed only questionable abnormality in the electroencephalogram not significantly different from the extremes of normal controls or from "nervous" children of questionable diagnosis.

3. The more severe the clinical chorea, the more severe the cerebral abnormality revealed in the electroencephalogram.

4. Clinical improvement showed a definite correlation with decreased abnormality in the electroencephalogram. In the more severe cases with recurrent attacks the abnormality in the electroencephalogram persisted in spite of apparent clinical improvement. Those cases showing prompt improvement in the electroencephalogram tended to recover more rapidly and completely from their chorea with less tendency for recurrence. Those cases showing little improvement in the electroencephalogram upon repeated examination had prolonged attacks of chorea and there was a marked tendency to recurrence.

5. The electroencephalogram may be of value in determining those cases with hereditary predisposition, since similar, though less severe, abnormalities may be found in the siblings of chorea patients especially in families in which there has been more than one case of chorea.

6. Chorea is considered a symptom of a cerebral disorder as definite as that of epilepsy and, like epilepsy, of varied etiology.

7. The abnormal electroencephalogram of chorea is not specific for this condition since it resembles closely certain dysrhythmias found in epileptic patients between attacks, those found in acute head injury, and other conditions causing generalized impairment of cerebral function. The wave forms most characteristic of the epileptic discharge were not observed in chorea, though striking similarities were observed in some cases.

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THE BACTERIOLOGY OF ACUTE OTITIS MEDIA AND ITS COURSE UNDER  
NEW AND OLD METHODS OF TREATMENT\*

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INFECTIONS of the middle ear are usually benign, but occasionally they lead to considerable involvement of the temporal bone, which may extend into the brain, brain coverings, or blood vessels. Death may result. On the other hand, acute otitis may smoulder on until it becomes chronic, or it may dry up and simply leave adhesions which produce a residual deafness. Since the advent of the sulphonamides there has been much controversy between the general medical men and the otologists concerning the various methods for treating otitis media and early mastoiditis.

Before whole-heartedly subscribing to any new form of treatment for a disease we should know the average expectancy under the old forms of treatment. Textbook chapters on otitis media infer or state that the acute suppurative and non-suppurative forms usually subside in a few days to a few weeks. This is correct, but how many cases may be expected to subside in a few days? What type are these? How may the physician decide which cases will subside spontaneously with simple remedies and which must be treated with the more heroic and potentially dangerous methods such as surgery or chemotherapy?

The expectancy of deafness in acute otitis has never been adequately studied. The only audiometric report is that of Bunch and Grove<sup>1</sup> who selected infants and examined them several years after they had had 3 or more myringotomies; 30 ears out of 160 (about 18 per cent) showed detectable deafness; 10 of these ears were discharging at the time of the examination. I could find no figures on the incidence of deafness following less severe otitis, and my own observations are not complete; they must be left for a future communication.

There are many reports in the literature which bear on the incidence of mastoiditis. They are

most confusing because they show anywhere from 1 to 69 per cent of cases of otitis media per year coming to mastoidectomy, and rarely involve enough cases or cover a long enough period to be of statistical importance.

That indiscriminate use of chemotherapy for acute otitis media to prevent mastoiditis is unnecessary and unwarranted will be shown in this paper, without in any way detracting from the wonderful results that can be obtained with proper dosage in many cases of early mastoiditis and even in meningitis of otic origin, when the invading organism is the streptococcus or pneumococcus.

When this study was begun it was intended to analyze the course of all the cases of acute otitis media in the Medical Centre since the children on the otologic service of the Presbyterian Hospital were taken over by the Babies' Hospital, and the service reached approximately its present activity in 1933. The cases were traced from their culture reports in the Department of Bacteriology because many of them were not definitely diagnosed as otitis media and therefore could not be traced in the Record Room. If bacteria were grown from the canal cultures and the case was not an external otitis (which could be ascertained from the chart) it was designated as acute suppurative otitis media whether so diagnosed by the attending surgeon or not. This material from the unit histories covering both in-patients and out-patient visits was too extensive for a complete study covering all the patients with suppurative otitis media from 1933 to June, 1940 (more than 4,500). Accordingly, the years 1938 and 1939 were selected for detailed appraisal, because in these years a comparison could be made between the cases treated with the old and new methods. Very little data were found concerning non-suppurative cases, unless they developed into suppurative cases, but it can be presumed that a much larger percentage of these cases than of the suppurative cases get well spontaneously. Perusal of Table I will show that during the years 1938 and 1939 approximately 79 per cent of all types of discharging ears dried up without

\* From the College of Physicians and Surgeons, Columbia University, the Presbyterian Hospital, the Babies' Hospital, the Vanderbilt Clinic and the Manhattan Eye, Ear and Throat Hospital.

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TABLE I.

DURATION OF DISCHARGE AND OCCURRENCE  
OF MASTOIDITIS IN O.M.P.A.

1938 and 1939—Without chemotherapy

Organism cultured	1 week or less	2 weeks or less	3 weeks or less	4 weeks or less	Over 4 weeks	Mastoid- ectomy
	Per- centage	Per- centage	Per- centage	Per- centage	Per- centage	Per- centage
<i>Staph.</i> All types 388 cases	41	65	77	85	10	4
<i>H. Strep.</i> 276 cases	16	31	49	63	15	16
<i>Pneumo.</i> All types 146 cases	45	72	82	89	5	6
<i>Others</i> 153 cases	36	56	65	70	20	10
Total 963 cases	35	55	68	79	12	9

chemotherapy in less than four weeks, and 35 per cent ceased to discharge in less than one week. The cases treated with chemotherapy will be discussed later.

Many factors contribute to the incidence and duration of otitis media, the occurrence in a given individual, and the development of extensions and complications:

be due to this organism much more than in the north.

2. *Age*.—The very young are said to have a higher morbidity. We found 25 per cent of our cases to occur in the ages 0 to 2, 57 per cent in the ages 2 to 12, and the remaining 20 per cent in the ages of 12 and older. Altmann finds a high incidence of mastoiditis in older individuals, as does Chang; neither compares this with the incidence of otitis media. Infants tend to have less pneumatization of their mastoids, and there is therefore less surface epithelium to produce exudate and less distance for the exudate to travel before it drains from the middle ear. For this reason, they are less likely to have severe mastoiditis. On the other hand, they have shorter, straighter Eustachian tubes, and especially if the tubes are blocked by adenoid tissue, they tend to become easily infected. Older people have more immunity to infection less adenoid and longer tubes which protect their mastoids. Children from 2 to 12, however, may have large mastoids and no immunity. They tend to have surgical mastoiditis.

TABLE II.

PERCENTAGE OF DIFFERENT ORGANISMS IN OTITIS MEDIA AS GIVEN BY VARIOUS AUTHORS

	<i>Hem.</i> <i>strep.</i>	<i>Other</i> <i>strep.</i>	<i>Pneumo.</i> <i>III</i>	<i>Other</i> <i>pneumo.</i>	<i>Staph.</i> (all)	<i>Others</i>	No. growth
Vaheri, Helsinki, Finland, 1932-6, 200 acute mastoids	68.5	0.5	21.0	3.0	1.5	2.5	
Altmann, Vienna, Austria, 1926-31, 1,457 acute mastoids	66.2		18.7	10.9		4.2	
Kreutz and Witter, Detroit, 1926-36, 300 acute mastoids	63.0	8.0	5.0	2.0	9.0	1.0	9.0
Inutsuka and Kikumaki, Japan, 1914-35, 414 acute mastoids	30.1	18.5	21.4	10.7	2.6	17.7	
Wirth, Heidelberg, Germany, 211 acute ears	41.4	18	20.0	19.9	7.7	6.2	
Duntap, Peiping, China, 1920-5, 488 unclassified	31.7	1.2	0.8	0.5	33.5	26.3	
*Fowler, New York City, 1933-9, 2,755 acute ears	33.6	2.7	6.4	11.1	36.7	9.5	
Page, New York City, 1933-4, 836 acute ears	30.1	2.1	13.9	0.3	22.4	7.9	23.3

\*Figures for pure cultures only. For mixed cultures see Table IV

1. *Place and climate*.—The percentage of various types of infection in different cities as given by other authors is shown in Table II. Unfortunately, I have been unable to find figures on otitis media from tropical countries, but H. M. Taylor, of Jacksonville, has the impression that the course and the bacteriology on the east coast of Florida is similar to that in the north. Lester A. Brown reports 66 per cent streptococcus in the mastoiditis of Atlanta, Ga. H. Colemore, of San Juan, tells me that the predominant organism in upper respiratory infections in Puerto Rico is the staphylococcus, and E. F. Font writes that otitis media tends to

3. *Time* (see Chart 3).—The disease occurs in yearly cycles, and in New York is most prevalent in March and April. In Japan it is November, December and January while in Baltimore (Fisher) it is most prevalent in December, January and February. Other cities undoubtedly show peaks according to the climate and incidence of respiratory infections.

4. *Sex*.—The incidence according to sexes seems to be almost evenly divided. Out of 1,496 cases we find 47.5 per cent females. Tomb<sup>4</sup> has reported a higher incidence in females, said to be due to the fact that mothers are more subjected to the upper respiratory



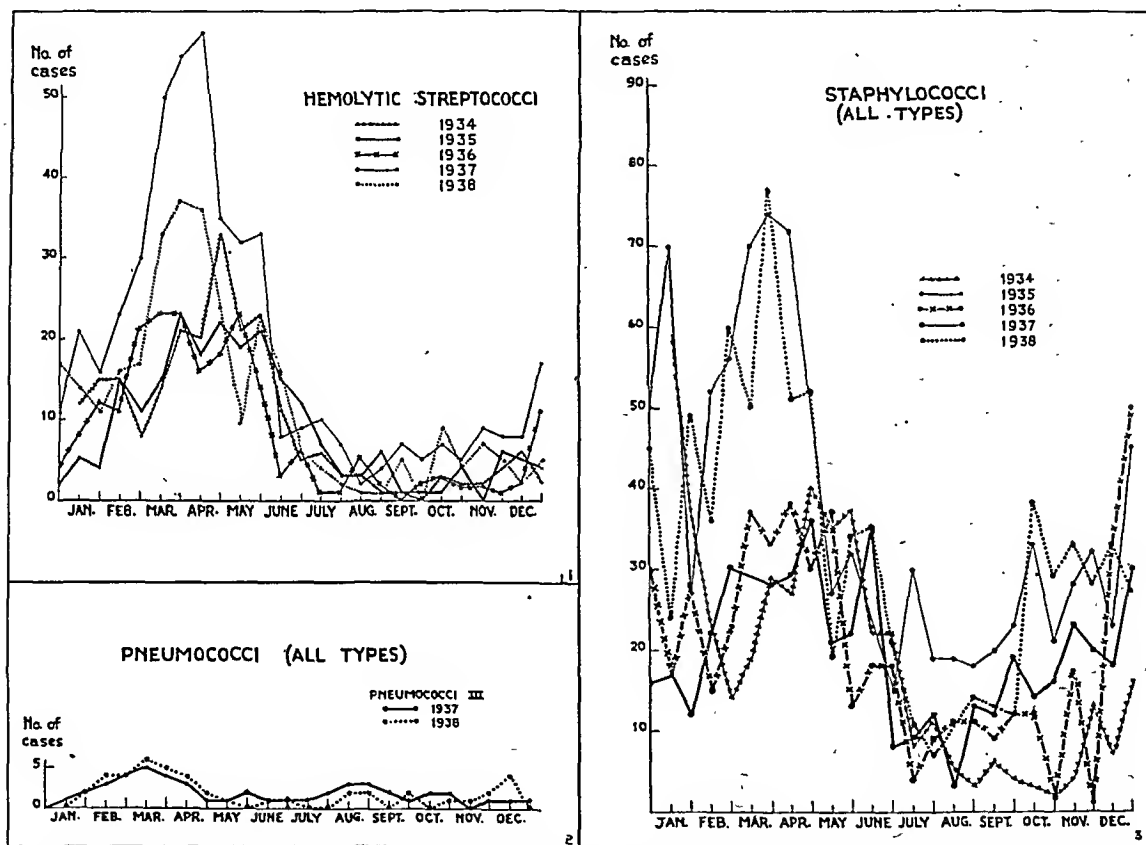
infections of their children than fathers. This does not occur in other reports, which usually show a slight preponderance among the males (cf. Altmann<sup>2</sup>).

5. *Occupation*.—There are a few figures on this (cf. Tomb<sup>4</sup>). It is a well known fact that professional swimmers, aviators and "sand hogs" are prone to develop otitis media. In confirmation of the impression of Tomb, that contact tends to spread otitis media, we find that our

7. *Habits*.—Improper clothing, blowing of the nose, swimming, flying, careless exposure to unusual weather conditions, fatigue, heavy drinking, smoking, all may be factors in otitis media.

8. *Diet*.—Vitamins are said to have considerable influence on infections of the upper air passages.

9. *Allergies*.—Allergic rhinitis tends to stop up the nose and cause secondary infections in



Charts 1, 2 and 3.—Showing the occurrence of otitis media in the Columbia Presbyterian Medical Centre, according to months and years.

student nurses in Babies' Hospital are more prone to develop upper respiratory infections and often otitis media when assigned to the ear, nose and throat service, than when assigned to other services.

6. *Heredity*.—This must be a most important factor. In the first place, it controls the pneumatization of the mastoid, the anatomy of the Eustachian tube, and the growth of adenoids, all potent factors in otitis media. Further, Webster has shown incontrovertibly that there are hereditary factors in both susceptibility and immunity to infection.

the upper respiratory passages, and sometimes directly stops up the Eustachian tubes.

10. *General physical condition*.—Patients with general debilitating diseases are prone to develop low-grade otitis media. This is particularly so in children and patients with diabetes, pneumonia, scarlet fever, influenza and measles. Those who are unusually susceptible to the common cold tend to develop otitis media.

11. *The physician and nursing*.—These often have much to do with the shortening of the disease process and the avoidance of operations. Early myringotomy is important. In our 1938

to 1939 series there were more than twice as many mastoidectomies following spontaneous perforation as following myringotomy. Page<sup>3</sup> finds the ratio 3 to 1. Many cases which would be operated on for mastoiditis by one surgeon will recover under the care of another more experienced or conscientious, with the courage to wait until it is certain that the patient will not get well without surgery.

12. *Reaction to medication.*—Some patients are sensitive to special medications; some excrete them so fast that they are practically valueless; some vomit or cannot tolerate them in other ways. There is always an indefinable individuality of response in a given case. Idiosyncrasies may account for fever, rashes, hæmaturia, neuritis or mental symptoms. More to be feared are anæmias and leukopenias. Kidney stones, anuria, and uræmia have occurred especially with sulfapyridine and sulfathiazole, but apparently this can be avoided if proper fluid intake and output are maintained.

13. *Chance.*—This is an indeterminate factor in all disease.

14. *Types of infection.*—The virulence of the organisms and the individual's immunity to it has much to do with the course of the disease. One of my graduate students, Dr. Frank Alter, has shown that in a case where a patient was combating a streptococcus infection well there was immediate *in vitro* phagocytosis of cultures of the patient's organism when mixed with his whole blood. In another patient, who was clinically not doing well, the *in vitro* phagocytosis of this patient's organisms by his own white cells was much less marked, in fact almost nil.

The types of infection found in our series are shown in Table III, and their incidence according to years and months in Chart 3. The incidence found by other investigators in other cities is shown in Table II. It will be noted that there is considerable variation in these figures, and the only ones that correspond to mine are the figures of Page. These include "no growth" in the total and so slightly lower the percentage values. For some unknown reason the percentage of pneumococci, other than Type III, is very low. The variation with all authors may well be due to their omission of organisms shown in Table III, which are usually contaminants. Certainly diphtheroids and fungi can very well be omitted, but they are included here for record and to give some

TABLE III.  
BACTERIOLOGY OF OTITIS MEDIA AS SHOWN BY  
ROUTINE CULTURES

Organism	No. from canal	Per-centage from canal	No. from mastoid	Per-centage from mastoid
Streptococcus Hæm.....	2,175	27.6	371	56.7
Staph. albus.....	1,451			
Staph. albus hæm.....	239			
Staph. aureus.....	808			
Staph. aureus hæm.....	995			
Staph. (all types):.....	3,493	44.4	99	15.1
Pneumo. Type I.....	227	3.0	14	2.1
II.....	28			
III.....	334	4.2	46	7.0
IV.....	33		2	
V.....	52		1	
VI.....	22			
VII.....	30			
VIII.....	23		1	
IX.....	5			
X.....	13			
XI.....	7			
XII.....	5			
XIII.....	7			
XIV.....	19			
XV.....	3			
XVI.....	13			
XVII.....	8			
XVIII.....	11			
XIX.....	42		2	
XX.....	3			
XXI.....	2		1	
XXII.....	4			
XXIII.....	5			
XXIV.....	2			
XXV.....	1			
XXVII.....	7			
XXVIII.....	6			
XXXII.....	2			
Unclassified.....	68			
Pneumo. (all types).....	992	12.6	73	11.1
S. viridans.....	356	4.5	8	1.2
B. pyocyaneus.....	250	3.1	12	1.9
B. proteus.....	156	1.9	10	1.5
B. subtilis.....	104	1.3	3	0.5
B. faecalis alkaligenes.....	75	0.9	1	0.1
E. coli.....	59	0.7	2	0.3
H. influenzae.....	56	0.7	2	0.3
C. diphtheriae*.....	50	0.6		
A. aerogenes.....	34	0.4		
M. catarrhalis.....	21	0.2	3	0.5
M. tetragenus.....	15	0.1		
B. Friedlanderi.....	10	0.1	2	0.3
Salmonella (unclassified).....	4	0.05		
Aspergillus niger.....	4	0.05		
C. tertium.....	2	0.02		
B. penicillium.....	1	0.01		
C. prodigiosum.....	1	0.01		
C. xerosis.....	1	0.01		
Total organisms.....	7,459		654	
Diphtheroids.....	858	10.9	37	5.6
No growth.....	278	3.2	119	14.9

\* Sugar tests positive but virulence tests negative. These cases would nowadays be classified as diphtheroids.

idea of the accuracy of the bacteriological reports. Part of the variation in reports of middle-ear bacteriology may also be due to the method of taking the cultures. Our cultures were made by inserting a sterile swab into the external meatus, to pick up the discharge from a spontaneous or myringotomy perforation. The organisms were first planted in both broth and blood agar, and then replanted on blood agar or special broths, if necessary, for identification of a certain organism. The canal was in many instances cleaned mechanically, filled with 70 per cent alcohol, emptied, and allowed to dry, but it is impossible to tell how often this was done. Page advises direct cultures from the myringotomy knife, but this is difficult if easy access to culture media is not available to the out-patient department.

organisms in cases which do not come to operation. The diphtheroids, fungi, and coli groups are undoubtedly contaminants in almost all instances, but some of the staphylococci tend to persist in chronic mastoids, and since they often occur in conjunction with streptococci they are included here, with the knowledge that they too may very well be contaminants two-thirds of the time. The probability of contamination can be estimated when we learn that from 25 normal canals staphylococcus was grown 11 times. Out of 153 cultures from canals before myringotomy the staphylococcus was recovered 91 times, and occurred in subsequent cultures of the discharge from the ear 62 times. The staphylococcus occurred in the middle ear but not in the canal 15 times, and 29 times in the canal but not in the middle ear.

TABLE IV.  
COMPARISON OF CULTURES TAKEN FROM THE EXTERNAL AUDITORY MEATUS  
BEFORE AND AFTER MYRINGOTOMY

	<i>Staph. alb.</i>	<i>Staph. aur.</i>	<i>Diphtheroids</i>	<i>B. subtilis</i>	<i>Hæm. strep.</i>	<i>Strep. vir.</i>	<i>M. tetrag.</i>	<i>Pneumo.</i>	<i>H. influenzae</i>	<i>B. proteus</i>	<i>B. alkaligenes</i>	<i>B. pyocyaneus</i>	Total organisms
<i>Cultures of skin before myringotomy:</i>													
Pure.....	52	11	13	8	5	2	2	1	0	0	0	1	95
Mixed.....	22	6	13	6	6	3	0	2	1	1	1	0	61
Total.....	74	17	26	14	11	5	2	3	1	1	1	1	156
<i>Cultures of discharge after myringotomy:</i>													
In discharge but not in skin culture.....	6	9	8	4	45	3	1	28	1	0	2	0	106
Same as skin and pure.....	7	3	0	0	1	1	0	1	1	0	0	1	15
With same organism as in skin culture.....	11	4	4	2	3	0	0	1	0	0	0	0	25
On skin but in discharge with different organism.....	13	3	2	2	0	0	0	0	0	0	0	0	20

Out of 153 cases, there were 27 which showed no growth before myringotomy, and 3 which showed no growth after myringotomy. The figures in the table represent the number of times a given organism was recovered.

Over 60 per cent of our acute otitis media cases grow out staphylococci or other organisms (Table III). Now, it is believed that many of the organisms recovered, including the staphylococcus, are merely unimportant contaminants of cultures taken from the neighbourhood of the tympanic membrane, and that the hæmolytic streptococcus is the only organism of importance in otitis media. This comes from using only cultures taken at mastoidectomy for otitis media studies (cf. Table II). Admittedly, these are most accurate from the bacteriological standpoint, but they may give us false ideas concerning the infecting

(For detailed bacteriology of the canal see Table IV and note that many of the organisms are the same as those shown in Table III, indicating that they are probably contaminants in many instances.)

The occurrence of "no growth" we believe largely to be due to drying out of the culture swabs, but the suggestion of Henry and Kuhn, that they represent a clinical entity of sterile otitis should be seriously considered. Theoretically, many of the cases showing no growth may have been invaded by anaerobic types of streptococcus which would have been recovered if unusual techniques for routine cultures had

been employed. But taking routine anaerobic cultures at the Presbyterian Hospital has uncovered no unusual pathogens during the spring of 1940, not even anaerobic streptococci, which did not grow under the usual aerobic methods. Anaerobic methods are apparently unnecessary as a routine procedure.

#### COMPARISON OF NEW AND OLD METHODS OF TREATMENT

As mentioned before and shown in Table I under the old methods of treatment about 80 per cent of acute suppurative otitis medias dried up without major surgery following treatment of the nose, nasopharynx and mechanical cleaning of the canal after spontaneous perforation of the drum or myringotomy.

We have had one successful experience with the treatment of otitis media with immune sera:

A 63 year-old woman with a large mastoid and profuse discharge developed a steadily rising temperature. Myringotomy had been performed a few hours after the onset of the disease, but the temperature rose until, on the third and fourth day it was 103° F. Culture from the discharge showed pneumococcus, Type I. Accordingly, Type I immune serum (using the rabbit globulin fraction to avoid reaction) was administered as for pneumonia. The temperature dropped to 100° in 24 hours, but rose to 102° the next day. Following a second injection of Type I antibody, the temperature remained normal and the discharge cleared in one week.

Since 1936 an entirely new approach to the problem of infections in the middle ear has been advocated, especially by the paediatricians and general medical men. The tendency has been to prescribe sulfanilamide, sulfapyridine, sulfathiazole or one of their modifications in the earliest stages of all types of otitis media, whether suppurative or non-suppurative, as well as for mastoiditis and its complications. It is much easier to prescribe pills than it is to do a myringotomy in the home. Often the patients demand that the sulphonamides be given, and occasionally they begin medication themselves by obtaining one of them without prescription from the neighbourhood pharmacist. Chemotherapy is the fashion. Hauser<sup>6</sup> reports that 90 per cent of the physicians who answered his questionnaires in 1938 used sulfanilamide and that 58.5 per cent used it without previous cultures. A few authors advise the combined use of chemotherapy and immune sera in certain cases (cf. Lyons).

My first attempt at chemotherapy for early otitis media was made in 1937, when the knowl-

edge of the sulphonamides was very limited. At that time it was believed that sulfanilamide should be reserved for streptococcus cases. It was known from the work of Lockwood and others that a continual maintenance of a certain amount of the drug in the blood is more important than intermittent higher levels. The mothers of patients (or if old enough, they themselves) were all carefully instructed to administer the drug at specific, carefully spaced hours of the day and night. Setting an alarm clock for each dose was advised. It was considered unsafe to prescribe very large doses of sulfanilamide to ambulatory patients, so that the minimum that could be expected to produce a result was ordered.\*

TABLE V.  
DURATION OF DISCHARGE AND OCCURRENCE  
OF MASTOIDITIS IN O.M.P.A.

1938 and 1939—With chemotherapy

Organism cultured	1 week or less	2 weeks or less	3 weeks or less	4 weeks or less	Over 4 weeks	Mastoidectomy
	Per-centage	Per-centage	Per-centage	Per-centage	Per-centage	Per-centage
<i>Staph.</i> All types 76 cases..	18	42	60	67	15	18
<i>H. strep.</i> 190 cases..	15	40	54	72	12	16
<i>Pneumo.</i> All types 58 cases..	43	65	81	68	4	8
<i>Others</i> 23 cases..	26	52	61	74	9	17
<b>Total</b> 347 cases.	21	46	61	74	11	15

The drug was stopped when the discharge stopped. After a few months of this study, involving 141 cases in one clinic and 83 in another, it did not seem that the duration of the discharge was any less than in the control series on alternate clinic days which were receiving no medication. It was suspected that the patients were ingesting insufficient dosage, and this was confirmed when several sulfanilamide blood levels were taken and found to be zero. It was found, moreover, that the instructions about the midnight and early morning dose were rarely obeyed. Particularly distressing were the num-

\* Each dose was 0.3 grams (5 grains) for children under five; 0.45 grams (7.5 grains) for children from five to twelve, and 0.6 grams (10 grains) for persons over twelve, five times a day, at 6 a.m., 10 a.m., 2 p.m., 7 p.m. and midnight. This makes a total of 1.5 grams (25 grains), 2.25 grams (37.5 grains) and 3.0 grams (50 grains) per day in each age-group respectively. Often the first dose was doubled.

ber of recurrences which occurred three or four days after the medication was stopped. The drug when given to ambulatory patients apparently merely attenuated the disease a little, and in the end prolonged its course.

Study of cases of otitis media medicated by others in the wards and clinics of the Medical Centre during 1938 and 1939 (Table V), when compared with the non-medicated cases (Table I) confirms this 1937 impression in more detail, and still gives no indication that chemotherapy is of any use in the treatment of suppurative otitis media.

Analysis according to dosage of 100 consecutive charts in which chemotherapy was used for

TABLE VI.  
EFFECT OF SULFANILAMIDE IN 100 CASES

Post-operative, questionable effect.....	6	
Reaction.....	6	
Recurrent.....	11	
<hr/>		
<i>Apparently</i>	<i>Inadequate dosage</i>	<i>Adequate dosage</i>
No effect.....	31	11
Questionable effect...	18	3
Good effect.....	18	25

All but four of the cases on adequate dosage were in hospital.

"Questionable effect" represents cessation in less than two weeks.

"Good effect" represents cessation of discharge in less than a week.

otitis media is shown in Table VI. Any case which did not receive the dosage in the footnote (see page 377) at least 4 times a day and which did not continue the drug in some dosage for at least two days after symptoms ceased was considered inadequate. Most of the cases listed under inadequate dosage were ambulatory cases. Most of those receiving adequate dosage were hospitalized. The commonest mistake in the inadequate dosage group was to stop medication too soon. A few cases under seemingly adequate dosage went on and developed mastoiditis in spite of everything. Most, however, responded even if the medication was not started for several days after the onset of the disease. After all, chemotherapy should be effective as long as there is no extensive necrosis in the mastoid, and we know from x-rays and from pathological specimens that this does not occur to any extent for two to three weeks and sometimes more after the initial infection.

The prolongation of the disease due to insufficient dosage often occurs in private practice, where a pædiatrician or a general practitioner prescribes a moderate dose of sulfanilamide

three times a day (often without cultures) for an early otitis. The usual practice is to stop the drug with the fall in the temperature or, at best, with the cessation of the discharge. These half-medicated cases later come to the otologist with necrotic mastoids. They may have no temperature, no pain, and a normal white count, especially if the medication has been started again with recurrence of symptoms. They are prone to develop complications under the very eyes of their physicians. The high erythrocyte sedimentation rate which usually occurs and a general feeling of malaise are often the only signs of anything wrong. An x-ray of the mastoid, if it shows definite breaking down, will often help, but even here, according to Law, sulfanilamide-treated patients do not show as much destruction in the mastoid or as much clouding by x-ray as the patient who has not been so treated.

Occasionally, infection in the mastoid goes on to necrosis in spite of adequate sulfanilamide treatment. In these cases there is usually some reduction of the pain and of the discharge, but at operation there is breaking down of the bone by a greyish, necrotic-looking granulation tissue from which rarely can be cultured an offending organism. It is the recurrent cases, and these last mentioned, masked cases which make so many thinking otologists suspicious of the new drugs. After all, it is the otologist who sees all the unsatisfactory results of medication, and is often called upon to diagnose and to instigate surgical procedures upon cases which are extremely difficult because the usual symptomatology has been masked by medication. Streptococcus cases become as difficult as the dreaded pneumococcus III cases used to be, and the latter become still more unpredictable.

On the other hand, there are examples of patients who, under the old methods of treatment, would have been subjected to mastoid operations, who have been cured by proper chemotherapy. Many of the 25 in Table VI are of this group. Let me report one extraordinary case:

A white man, aged 76, came to my office with a history of discharge and loss of hearing in the left ear of three months' duration. He had been treated for this in a fashionable winter resort by injections of *M. catarrhalis* vaccine. Examination showed an external canal filled with thick, purulent material which grew a pure culture of pneumococcus III on four separate occasions. There was no pain, but rather a full feeling in the ear and a well-marked sagging of the superior canal.

wall. Two consultants, one an eminent otologist and the other an internist, agreed that chemotherapy in this case would probably be of no avail. It was decided, however, to try sulfapyridine, with the proviso that if there was no improvement in three or four days operation must be performed. In three days the discharge had decreased considerably, in five days it had stopped, but the drum continued to be without landmarks. It was red superiorly and the canal wall still sagged. Finally, on the twelfth day, the hearing suddenly returned. Not until then was the medication decreased. The blood level had been kept as high as 11 mg. per cent. The patient was kept in the hospital for a week after cessation of the medication. He complained at no time from the effects of the drug and had no recurrence.

Most cases where the disease has progressed as far as in the one cited will not respond to chemotherapy, even if given in high dosage for a long period of time. Chemotherapy is worth trying, however, if there is no extensive destruction in the mastoid to be seen by x-ray. Lockwood has shown that in the presence of tissue destruction chemotherapy is rarely effective. If there is no improvement of the clinical course of a suspected case in a few days the operation must be done. In a very few cases in the series, the temperature fell gradually over a period of ten days, but even here there was clinical evidence of improvement: loss of pain, etc., in 24 to 48 hours after starting the drug.

There is some evidence that the post-operative course will be shorter if the patient's blood is kept saturated with the proper drug. Theoretically, there is less chance of complications. We have had no cases of complication and never delayed healing of the wound following mastoidectomy in cases where sulfanilamide was given pre-operatively, followed by sustaining doses for a few days after the cessation of the fever post-operatively. The only possible objection to the use of both chemotherapy and surgery together is that *masking of complications* may occur.

In studying this subject one suspects that more patients are admitted to the hospital for chemotherapy, thus raising the *recorded* number of cases of otitis media and so lowering the percentage of mastoiditis. The treatment with sulfanilamide is expectant treatment, and if one waits long enough many patients that might ordinarily be operated on will get well spontaneously. Most otologists have had the experience of putting off a mastoidectomy for two or three days, because there were no beds in the hospital or some other inconvenience, only to find the patient recovered in the meantime.

## SUMMARY AND CONCLUSIONS

Acute suppurative otitis media is, as a rule, a self-limiting disease; 80 per cent of unselected clinic cases get well in less than 4 weeks. A higher percentage of cases get well in this time if the canal is kept clean, the nose shrunk, and there is proper care of the Eustachian tube. A still higher percentage get well if the disease is non-suppurative. More patients would avoid mastoidectomy if their surgeons could treat them expectantly for a longer period.

The incidence of otitis media and the virulence of the organism causing it, vary from year to year. There is also variation with location. In New York, the incidence is high and peaks are in March and April, but there is a secondary peak in December. The former tend to be due to streptococci, the latter to staphylococci. Approximately 40 per cent of middle-ear cultures taken from the external auditory meatus contain staphylococcus and 10 per cent contain other organisms for which no chemotherapy has as yet been developed.

A large percentage of the cures attributed to chemotherapy are due to spontaneous remission rather than to medication. On the other hand, if a case of acute, suppurative otitis media is due to a beta-hemolytic streptococcus or a pneumococcus, and does not seem to be doing well during the first week or ten days of the disease vigorous chemotherapy should be instigated. It is more often indicated following spontaneous perforation than following early myringotomy. As the years go by we may expect to have specifics for other organisms and fewer toxic side actions.

Ambulatory dosage of sulfanilamide or similar drugs is unjustified. Chemotherapy is not indicated unless it is suspected that the given case of otitis media is progressing to mastoiditis, chronicity, or deafness.

Chemotherapy need never be instituted without bacteriological study. If chemotherapy is instituted it should be applied, if possible in the hospital or in the home, with cultures, blood counts and urinalysis every two days under the direction of a trustworthy nurse, who understands the importance of continuous dosage and proper fluid intake and output.

Chemotherapy should be considered in the same class as surgery, as a serious treatment, and its administration continued for *at least a week* after acute symptoms cease. If chemo-

therapy in adequate dosage does not change the clinical picture markedly in two to three days, another treatment, usually surgery, is called for.

Chemotherapy usually masks the classical symptoms of progressing otitis media, and the handling of an individual case must be coloured by this fact. If lateral sinus involvement is suspected it is wise not to complicate the picture by chemotherapy, which will only prolong the course of the disease if a perisinus abscess or infected clot is present. Chemotherapy does not replace surgery if an undrained, necrotic focus is present.

As new, more efficient, and less toxic drugs come on the market our ideas must necessarily change, but any physician who in shot-gun fashion prescribes a drug to all cases without discrimination is reflecting ignorance, laziness,

or poor judgment as to the expectancies of serious trouble from otitis media. He may sensitize his patient, damage his liver or kidneys, or render him drug-fast while using chemotherapy for a minor ailment, which at a later date might then be unavailable for a serious infection.

The author was assisted in this paper by Anna Adler, Helen Vogel, Olivia Jarrett, and Drs. Alter, Friedman, Howley, Jordan and Rosé, to whom thanks is hereby expressed.

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The references given above are key references only. A fuller list can be obtained on application to the author.

## THE DIETARY MANAGEMENT OF INTESTINAL TUBERCULOSIS\*

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FOR a number of years we have studied the cases of intestinal tuberculosis occurring among the tuberculous patients in the Mountain Sanatorium, Hamilton. During this time we have gradually made progress in the institutional and dietary care of these patients. In this communication are presented the details of the diets used.

From January 1, 1935, to July 1, 1940, we have studied 120 cases of intestinal tuberculosis. These cases were admitted directly to our intestinal service or transferred to that service from other wards within the institution. All have been under treatment for more than six months, unless death intervened. Ninety-five per cent of the patients had far advanced pulmonary tuberculosis, and all but one showed sputum containing tubercle bacilli. The diagnosis of intestinal tuberculosis was made by means of x-rays of the gastro-intestinal tract, according to the method and diagnostic criteria of Brown and Sampson.<sup>3</sup>

In 17 of the patients who died and had post-mortem examination the diagnosis of intestinal tuberculosis was confirmed in each instance. All of the 120 cases were of the type of intestinal tuberculosis most commonly encountered, that is, they exhibited ulcerative intestinal lesions, the infection occurring by way of the intestinal tract as the result of swallowing sputum containing tubercle bacilli.

Of the 120 patients studied 61 died. Twenty-two of the 61 died in from three days to four months following their transfer to the Intestinal Service. All of these twenty-two had active, progressive pulmonary tuberculosis, which precluded any chance of recovery, apart altogether from the existence of the intestinal complication.

For 15 of the remaining fatal cases, the intestinal lesion was not a major factor in the causation of death. The various causes of death in this group were as follows: hemoptysis, two cases; post-operative deaths following major chest surgery, three cases; amyloid disease, one case; tuberculous empyema with broncho-pleural fistula, one case; acute bronchogenic spread of pulmonary tuberculosis, one case; rup-

\* A paper read at the Annual Convention of the Canadian Tuberculosis Association, in Montreal, June, 1940.

† Dietician.

‡ Physicians who did the gastro-intestinal radiology.



tured duodenal ulcer, one case; slow extension of pulmonary tuberculosis, four cases.

In 10 of the 15 cases listed above repeat x-rays of the gastro-intestinal tract showed definite improvement of the intestinal complication. In 5 others of the fifteen these repeat intestinal x-rays showed no increase in the intestinal disease. In 4 of the 15 cases autopsies were performed, and the cause of death was found to be, respectively, perforation of a duodenal ulcer, hæmoptysis, acute bronchogenic spread of pulmonary tuberculosis, and tuberculous empyema.

Of the total 120 cases in this series 59 were alive on July 1, 1940. The present condition of this group of 59 is as follows: 22 are discharged; 17 are still in the sanatorium, but not under treatment for intestinal tuberculosis, which, clinically and by x-ray evidence, is cured or greatly improved; 20 cases are still under dietary treatment. Of these 20 a group of 14 show by intestinal x-ray definite improvement of their intestinal ulceration. Six cases have still an uncertain prognosis.

In the treatment of intestinal tuberculosis proper dietary management is always important, and frequently is absolutely essential for the patient's recovery, no matter what other form of therapy is used. Theoretically, the dietetic therapy of intestinal tuberculosis consists in supplying food which will be optimum for nutrition in a bland, low-residue form, which will produce the least irritation and diminish excessive peristalsis in the intestinal tract. The necessity for modification of the ordinary ward diet to meet these criteria has been recognized by many authors.

Moore<sup>10</sup> refers to the greater difficulty and need for maintaining nutrition when intestinal ulceration supervenes in a case of pulmonary tuberculosis. Chan<sup>4</sup> mentions the value of bland diet in decreasing peristalsis and advocates the use of vitamins D and C, not only to aid calcium metabolism but to accelerate healing of the intestinal mucosa. McConkey<sup>8</sup> showed the curative effect of vitamins C and D on the intestinal lesion when tomato juice and cod liver oil, the latter of course including vitamin A, were added to a general diet. Steinbach,<sup>11</sup> using McConkey's treatment, and estimating the results of therapy on autopsy findings does not believe that this treatment is either preventive or curative. McLaughlin<sup>9</sup> recommends the use of high vitamin diet. He also advises against the use of certain foods, such as peas, beans, cabbage, be-

cause of their fermentation producing gas, which by distending the bowel stimulates peristalsis. Dixon<sup>5</sup> advises against very cold drinks, strong coffee, fruits, salads, concentrated beef essences and excess milk, because he believes they increase intestinal peristalsis unduly. He definitely advises low-residue high vitamin diet. Brown<sup>8</sup> advocates bland, low-residue high vitamin diet. Bellinger<sup>1, 2</sup> has given low-residue diets but has compromised on a more generous diet which supplies adequate vitamins and minerals. He points out the need for supplying adequate vitamin C because the absorption of vitamin C is directly proportional to the clinical activity of tuberculosis. Gorman<sup>6</sup> advises a bland diet, non-irritating, not too high in calories, with sufficient protein and high vitamin content. Hardt<sup>7</sup> advocates a high vitamin high mineral diet, smooth, and of low residue. He also recommends the giving of calcium per os.

To summarize, the diets recommended range from a general diet with added cod liver oil and tomato juice to a low-residue diet, bland in type, with an ample supply of vitamins and minerals. It is agreed that bland diets are best for alleviating intestinal symptoms, but two difficulties are mentioned in their use, namely, the lack of vitamins and minerals and the patient's unwillingness to accept such diets for long periods of time. Certain foodstuffs are contraindicated because of their direct or indirect effect in increasing intestinal peristalsis.

#### PRESENT INVESTIGATION

At the time our investigation began, namely, January 1, 1935, the treatment of our intestinal cases was carried on as part of the general food service for the entire institution. The intestinal cases were being fed on a modification of general diet, as follows. No onions or cabbages were allowed; other vegetables were puréed; no pork was allowed, except bacon; desserts were usually milk puddings. Each intestinal case received one-half ounce of cod-liver oil and three ounces of tomato juice per day. These patients were scattered throughout the general wards of the institution and were sometimes difficult to please, and there was a general feeling, based on past experience, that they would not co-operate on any stricter diet regimen for any length of time.

During 1935 many of these intestinal cases were transferred to this service. We kept most of them for some months on exactly the same



diet as had been given them before transfer, and yet in many instances we achieved a weight gain for 3 to 10 months, where formerly the same people had a maintained or losing weight record for 3 to 6 months. The onset of a better weight record was too prompt to assume that at the time of their transfer to this diet service they were at the point of improving. In fact most of them were showing maintained or extending pulmonary disease at the time of their transfer.

The better nutrition was achieved obviously not by diet *per se*, which was unchanged, but by stricter individual attention to the patients. Such attention is possible only where nurses and dietitians can work in unison on a service for these cases. By stricter supervision of the patients we found that some had not previously been taking enough milk. Others had taken too much milk per meal, and consequently left a great part of the meal uneaten on many occasions. Other patients were not eating enough protein. We found that by talking to them and explaining the situation their former dislikes for certain foodstuffs could be overcome. Some patients had occasionally been given egg-nogs between meals, and this often prevented their eating the next meal fully.

As time went on we planned a diet called "low-residue diet" and which will be referred to as such. This diet we have used routinely on many cases for the past four years. The details of this diet are given below.

#### LOW-RESIDUE DIET

##### *Breakfast*

Strained fruit juice—50 to 100 grams: orange, grapefruit, pineapple or tomato juice.

Milk—50 to 150 grams.

Bacon—20 grams, or 1 egg. If the patient has a good appetite he is given both bacon and egg.

Bread—10 to 30 grams: white bread or toast, or soda biscuit.

Honey, corn syrup, or clear jelly—20 grams, *e.g.*, crab-apple jelly or any jelly without seeds or pulp.

Cream—50 to 100 grams, 32 per cent cream is used for all diets.

Cereal—Cooked cereal, relatively bran-free, 75 to 100 grams (cooked weight).

##### *Dinner or Supper*

Soup—A clear stock soup, oxo, or bovril, is used, but if the patient is likely to fill up on soup and leave other parts of his meal it is left off the diet.

Meat—30 to 50 grams: scraped beef, tender roast chicken or lamb, chicken or lamb stew, boiled, baked or steamed fish, sweetbreads and oysters. One egg may replace 30 grams of the above meats.

Potato—50 to 100 grams: baked, mashed or boiled. For variety an equal amount of rice, macaroni or spaghetti may be substituted for the potato.

Vegetable—50 to 100 grams: given only once a day. Puréed peas, carrots, corn, beets and tomato. Squash, asparagus tips and cauliflower need not be puréed.

Bread—10 to 30 grams.

Milk—50 to 150 grams.

Cream—32 per cent, 50 to 100 grams.

Dessert—*For dinner*—an average serving of plain milk dessert, such as custard, junket, sago, tapioca, rice, or ice-cream.

*For supper*—a serving of sweetened fruit, 50 to 100 grams, such as canned peaches, pears, also apple sauce, bananas, or grapefruit and orange sections, free from membrane.

Sugar—15 to 60 grams per day.

There is no night feeding on the low-residue diet.

Each patient on this diet receives 3 ounces per day of tomato juice, and one-half ounce of cod liver oil.

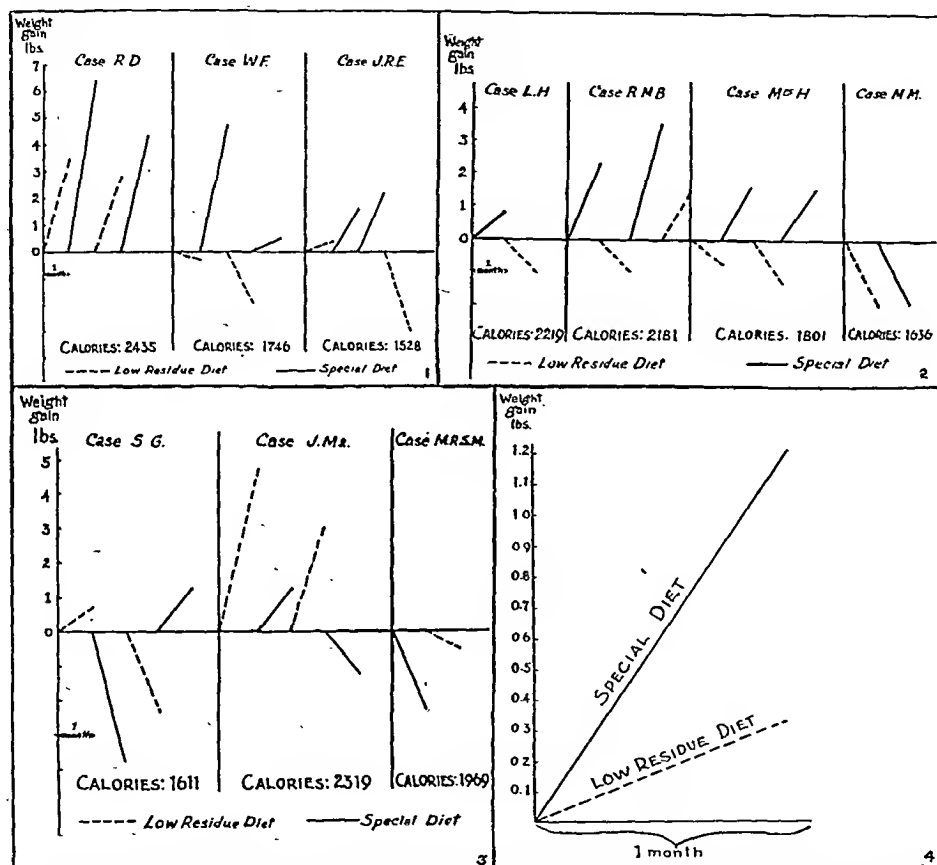
Early in 1935 we had to meet the problem of feeding cases of intestinal tuberculosis who had definite gastro-intestinal symptoms such as nausea, loose stools, colic, pain after eating, or pain after defæcation. We felt that an even more bland diet with smaller feedings would be better than the low-residue diet in relieving such symptoms. In the construction of this blander diet we have kept in mind the point that it must provide an ample supply of vitamins and minerals in addition to the other food elements in a very bland form. At the same time this optimum diet must be one that can be easily prepared and which is suitable for institutional use. In constructing it we have made use of the precooked cereal mixture—pablum, which fulfills the above-mentioned requirements. Our special diet is identical with the low-residue diet in all foodstuffs and proportions, and with servings of the same, including cod liver oil and tomato juice, with the following exceptions: (1) no vegetables are served; (2) the breakfast cereal is 15 grams of pablum, dry weight, mixed with hot water to the desired consistency; (3) the same pablum feeding is served at dinner and supper. The same night feeding at 8:00 p.m. of pablum is given with 50 grams of cream.

It was found that nearly all cases of intestinal tuberculosis would adhere to the dietary regimen as laid down in our special diet. In general our records showed that cases on either low-residue diet or the special diet did better than those on the ordinary ward diet to which had been added cod-liver oil and tomato juice. In most instances the patients showed improvement when changed from the low-residue diet to our special diet. Symptoms related to the gastro-intestinal tract, such as loose stools, colic, pain after eating, and pain after defæcation which could not be controlled by the low-

residue diet frequently cleared up when the patient was placed on our special diet. The special diet in most cases produced a more consistent gain in weight than the low-residue diet, which in turn was more effective, nutritionally, than ordinary diet.

Especially during the first year of our investigation we had to treat many cases of intestinal tuberculosis whose pulmonary tuberculosis was hopeless. Even in such cases we

this point, we began a further step in our investigation. This was to compare the two diets, low-residue and special diet, by giving the one diet for a certain period of time, usually one month, but keeping the calories given per day the same. For example, a patient for a three-day period would have his meals adjusted within the limits of the outlined low-residue diet, so that we knew just how much bread, milk, and butter, etc., he usually ate. Then he was



Charts 1, 2 and 3.—Weight gain per month of patients fed alternately on low-residue diet and special diet. Chart 4.—Average weight gain per month of patients fed low-residue diet compared with their gain while receiving same number of calories in the form of the special diet.

could, using weight records as the criteria, frequently maintain satisfactory nutrition for months by means of the special diet in cases which did not do well on ordinary diet or the low-residue diet.

While we had determined that in most cases the special diet was of greater value than bland diet in bringing about gain in weight, the reason for this was not clear. Were the better results due to a difference in the nutritional constituents of the diets, or were they the result of an extra caloric intake? To settle

weighed and his meals per day were sent out with a known content for the day of calories, protein, fat, and carbohydrate. This necessitated strict weighing of the day's rations. This same diet per calories, protein, fat and carbohydrates was served each day for one month usually, or sometimes longer. After each meal any food left uneaten was weighed and the calories, protein, fat and carbohydrates uneaten were recorded. The patient was weighed every two weeks and at the conclusion of his period of low-residue diet. Then he was changed over

to special diet, of the same calories each day, and, as before, food returns were estimated. The patient was kept on the special diet for the same period of time. These diets were alternated in this manner. Sometimes special diet was used first.

During the past fifteen months, ten patients have been investigated in this way. The results for these ten cases are presented in graphs showing the grams of protein, fat and carbohydrate fed, and the weight records. Chart 1 shows the data for three cases, namely R.D., W.F., and J.R.E. This shows the weight records for four periods of one month each for each case, the two diets—low-residue and special diet—alternating, one month low-residue then one month special diet, and so on.

## CASE R.D.

	Protein	Fat	Carbohydrate
Special diet .....	79.9 x	157.0 x	175.6
Low-residue diet ....	73.4 x	131.5 x	194.0

## Calories returned on above diets

	Month 1	Month 2	Month 1	Month 2
Special	none	1031.0	Low-residue	154.0 539.0

## CASE W.F.

	Protein	Fat	Carbohydrate
Special diet .....	58.1 x	122.6 x	102.6
Low-residue diet ....	54.9 x	105.7 x	144.2

## Calories returned on above diets

	Month 1	Month 2	Month 1	Month 2
Special	60.0	533.4	Low-residue	560.0 108.0

## CASE J.R.E.

	Protein	Fat	Carbohydrate
Special diet .....	61.3 x	99.9 x	96.1
Low-residue diet ....	59.0 x	104.9 x	89.3

For this case there were no food returns on either the low-residue or special diet.

Chart 2 shows the data for four cases, namely, L.H., R.M.B., Mrs. H., and M.M.

## CASE L.H.

	Protein	Fat	Carbohydrate
Special diet .....	71.4 x	143.0 x	161.7
Low-residue diet ....	68.4 x	135.0 x	182.1

## Calories returned on above diets

	Month 1	Month 1
Special	209.5	Low-residue 220.0

It is only fair to note that this patient had one month of special diet weighed before the month of special diet shown, with equal weight gain as for the month of the graph, and then had two more months of special diet with a maintained weight following the month on low-residue diet. In other words, he was on the strict weighed diet regimen for four months but was willing to take the low-residue diet for only one month of the four.

## CASE R.M.B.

	Protein	Fat	Carbohydrate
Special diet .....	71.4 x	143.0 x	152.2
Low-residue diet ....	66.4 x	133.5 x	177.9

## Calories returned on above diets

	Month 1	Month 2	Month 1	Month 2
Special	112.5	449.7	Low-residue	534.5 2005.9

## CASE MRS. H.

	Protein	Fat	Carbohydrate
Special diet .....	57.5 x	115.0 x	134.1
Low-residue diet ....	70.7 x	100.4 x	153.8

## Calories returned on above diets

	Month 1	Month 2	Month 1	Month 2
Special	none	none	Low-residue	343.0 227.7

## CASE M.M.

	Protein	Fat	Carbohydrate
Special diet .....	55.9 x	109.5 x	107.2
Low-residue diet ....	68.7 x	98.8 x	144.8

## Calories returned on above diets

	Month 1	Month 1
Special	1902.6	Low-residue 929.6

This case continued on special diet, same calories, 4 months more with a gain of 4½ pounds.

Chart 3 illustrates the data for three cases, namely, S.G., J.M., and M.R.S.M.

## CASE S.G.

	Protein	Fat	Carbohydrate
Special diet .....	49.5 x	105.5 x	116.1
Low-residue diet ....	53.7 x	93.8 x	138.2

## Calories returned on above diets

	Month 1	Month 2	Month 1	Month 2
Special	3117.6	1395.9	Low-residue	2479.9 1735.6

This case had progressive extension of pulmonary tuberculosis throughout the above four months.

## CASE J.M.

	Protein	Fat	Carbohydrate
Special diet .....	64.9 x	154.3 x	167.2
Low-residue diet ....	78.7 x	135.3 x	196.8

## Calories returned on above diets

	Month 1	Month 2	Month 1	Month 2
Special	96.0	1589.0	Low-residue	1925.5 none

## CASE M.R.S.M.

	Protein	Fat	Carbohydrate
Special diet .....	61.5 x	131.5 x	135.1
Low-residue diet ....	63.5 x	124.0 x	149.8

## Calories returned on above diets

	Month 1	Month 2
Special	440.4	Low-residue 1748.4

For the ten cases shown above special diet gave better results in six cases, namely, cases R.D., W.F., J.R.E., R.M.B., L.H., and Mrs. H.

Low-residue diets gave better results in two cases, namely, cases J.M., and M.R.S.M.

In two cases either diet seemed to produce equal results. These were M.M., and S.G.

In Chart 4 is shown the average weight gain per month of the ten patients shown separately

in Charts 2, 3 and 4, who were alternated on low-residue and special diet. While the average weight gain for the one month period on the low-residue diet was 0.34 pounds, the same patients on the special diet made an average gain of 1.2 pounds, three and a half times as great.

### CONCLUSIONS

The treatment of ulcerative intestinal tuberculosis is not only a medical problem in itself but for any sanatorium is an institutional problem. Because the intestinal ulceration is secondary to pulmonary tuberculosis, which may be hopeless, and because some cases of intestinal involvement recover without any special attention to diet there is not sufficient appreciation of the vital need of giving patients with intestinal tuberculosis a strict plan of diet.

Any reasonable diet regimen with proper supervision and check on individual errors in the taking of the same is definitely shown in this investigation, to supply better nutrition than the same diet regimen without special and detailed supervision on the part of physician, dietitian and nurses.

The best diet for relieving intestinal symptoms and for supplying nutrition, as shown by gains in weight, or prevention of loss of weight, is a diet which we have described, that is relatively bland, low in residue, with sufficient protein, ample in vitamins and minerals, with four feedings per day. In this diet ample supplies of vitamins and minerals have been obtained by the incorporation of cod liver oil, citrus fruit juices, tomato juice, and pabulum.

Evidence has been presented in this paper showing that such a diet supplies better nutrition on the same calories per day than another diet, which, although low in residue and containing the same calories, has a lower vitamin and mineral content, is less bland, and has only three feedings per day.

It is recommended that this blander diet should be used in all intestinal cases except in the following exceptions: (1) where the intestinal lesion does not need any treatment at all, and (2) where with the onset of intestinal tuberculosis there occurs a spread of disease in the lung which is known to be the beginning of a continual, progressive pulmonary spread. It is often very difficult to identify such exceptions at the time the intestinal tuberculosis is diagnosed by x-ray.

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ASPIRIN AS A GARGLE.—The value of antiseptic gargles has always been more or less suspect. Prof. David Campbell in his "Handbook of Therapeutics" says bluntly: "Gargles are really of very little use in throat affections, as they do not reach beyond the anterior pillars of the fauces." Some grant that they are often soothing to the patient, but say that to be of any value they must be hot, when they act merely as fomentations; what the hot water contains is of little moment so long as it is harmless. Still others back their own fancy mixture of phenol and bicarbonate, or what you will. Lately the curious practice of employing powdered aspirin stirred in lukewarm water as a gargle has been gaining in popularity. It is true that aspirin in solution has an antiseptic power about equal to that of phenol, but since acetylsalicylic acid is non-volatile and is soluble only to the extent of 1 in 300 in cold water,

though it is more so in warm water and possibly in saliva, there seems to be little to recommend it as an antiseptic in a gargle. The aspirin gargle is esteemed also as a local analgesic in sore throat and after tonsillectomy, but the relief of pain may be partly due to the central action of the drug after absorption, for the instructions are explicit that the aspirin should eventually be swallowed. A totally unexpected incrimination of aspirin when used in this manner comes from a chemical study by Dott, who has investigated the effects of aspirin solutions on the teeth. His brief paper demonstrates beyond doubt that appreciable quantities of the calcium of the teeth go into solution when an aspirin gargle is used. Dott's analyses, confirmed substantially by the independent observations of Dr. J. C. Thompson of the clinical laboratories of the Edinburgh Royal Infirmary, suggest that aspirin used as a gargle is of limited value.—*The Lancet*, 1940, 2: 526.

## MANAGEMENT OF THE NUTRITIONAL ANÆMIA OF INFANCY\*

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THE classification of the anæmias of infancy is a lengthy one, for they constitute a large field which can only be referred to in part. It is intended, therefore, to deal merely with one type, namely—nutritional anæmia of infancy, commonly referred to as iron-deficient anæmia, or hypochromic anæmia.

With the accepted view that iron deficiency is the underlying factor, the management of such anæmia should be directed toward iron-sufficiency. Accordingly, with this in mind, an attempt is made to present and to evaluate some of the more recent concepts of therapy and dietary management. Iron constitutes one of the most effective and possibly the commonest of all forms of medication employed by clinicians dealing with the younger age-group. The frequency with which iron is used is ample evidence of the prevalence of anæmia of infancy, and points to an ever increasing confidence in the efficacy of this form of treatment.

*Physiological anæmia.*—In order to recognize various grades of anæmia a standard hæmoglobin curve (Chart 1) has been established by Mackay<sup>10</sup> which represents an optimum hæmoglobin level. These figures are for normal breast-fed infants given iron at 4 months of age. At 6 months the hæmoglobin was raised to 86 per cent, which level was maintained throughout the first year. Control groups were included for comparison. According to this standard 70 per cent of infants in her series in a later investigation were anæmic. A lower incidence is reported by other investigators.

Following the high hæmoglobin content at birth a rapid destruction of red blood cells sets in, with a consequent fall in hæmoglobin in the new-born period. Incidentally, this iron liberated by hæmolysis is stored and constitutes an available reserve. The low hæmoglobin reached in the second month is the so-called "physiological anæmia", after which there is a gradual rise in hæmoglobin during the third and fourth month which increased up to the sixth month.

From the sixth to the twelfth month the hæmoglobin tends to fall slightly. During the second year it rises slowly until normal values are reached, attaining the adult level at adolescence. It must be born in mind that the average hæmoglobin of 75 per cent is considered normal for

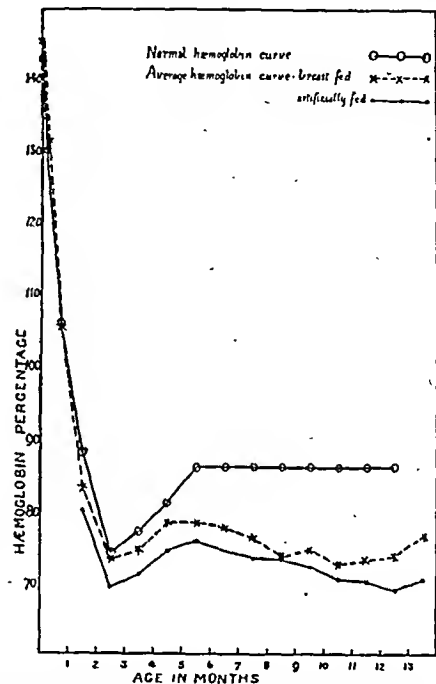


Chart 1.—"Optimum" hæmoglobin curve in the first year of life from early iron administration (Mackay<sup>10</sup>).

infants under 2 years of age (Chart 2), according to Haden.<sup>5</sup>

*Depletion of iron reserve.*—The factors concerned in the causation of nutritional anæmia are varied. Consequently, it will be sufficient to focus on certain aspects relevant to its production which may be influenced by treatment. The underlying principle in nutritional anæmia is the iron deficiency due to depletion of the iron reserve. There seems to be a general agreement that iron is stored in the fetus throughout its uterine existence, possibly more so in the later months of pregnancy. The infant must rely on this reserve supply, aided by the iron deposited as a result of hæmolysis which occurs shortly after birth. This reserve gradually becomes depleted, since the intake of iron either from

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breast or cows' milk is inadequate, so that by the end of the sixth month there is an exhaustion of the available reserve iron. This contention is adequately substantiated by histological and chemical studies.<sup>6, 22</sup> Fundamentally this is the basis of iron-deficient anæmias. Consequently, when it has been established that a study of the hæmoglobin content of the blood indicates a definite or borderline anæmia the administration of some form of iron is indicated. This may be effectively started as early as the third month, as it has been shown by Josephs<sup>6</sup> that iron therapy is ineffective prior to that age. By early administration of iron during the first year, Mackay<sup>9</sup> has shown that the morbidity rate is

is supported by Gottlieb and Streat,<sup>4</sup> working with a large group of infants in Montreal. They compared the offspring of mothers receiving adequate iron therapy with infants of a group of non-treated mothers. A significant average gain of 31 per cent of hæmoglobin was found at the end of an 8 month period in infants born of mothers receiving iron therapy. Consequently, it becomes apparent that the treatment of anæmic mothers is the first important step in the prevention of iron deficient anæmia in the infant.

#### TREATMENT

In regard to active treatment some form of iron is indicated. The choice of an iron preparation is of the utmost importance. Each clinician has his own favourite which through experience he has found most satisfactory. For an infant the selection should depend on ease of administration, solubility, tolerance, effectiveness, and inexpensiveness.

Amongst the inorganic preparations, iron and ammonium citrate is still one of the favourites, as it fulfils most of the requirements aforementioned. Although this salt is in the ferrie state it is readily converted into

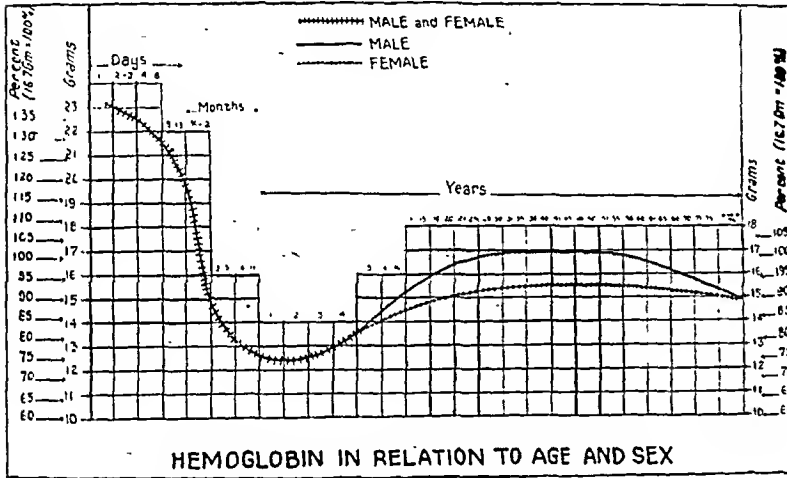


Chart 2.—A hæmoglobin of 75 to 80 per cent considered normal during infancy (Haden<sup>5</sup>).

reduced as much as 50 per cent. There is also a significant gain in weight of from 2½ to 3 pounds in infants receiving adequate iron therapy over a 3 months' period.

**Maternal anæmia.**—The relationship of maternal to infant anæmia is of great importance. Amongst influential factors such as birth-weight, rate of growth, and infections, which are beyond our control, there is one factor, namely, the influence of maternal anæmia on infant anæmia, which definitely lends itself to correction. This factor has received a minimum of attention. However, Strauss<sup>18</sup> referred to this particular problem, and said that infants born by women suffering from hypochromic anæmia exhibited a normal blood picture at birth, but developed moderate to severe degrees of anæmia during the first year of life. He went on to show that this infant anæmia may be prevented by the administration of iron to the mothers during pregnancy. This

is supported by Gottlieb and Streat,<sup>4</sup> working with a large group of infants in Montreal. They compared the offspring of mothers receiving adequate iron therapy with infants of a group of non-treated mothers. A significant average gain of 31 per cent of hæmoglobin was found at the end of an 8 month period in infants born of mothers receiving iron therapy. Consequently, it becomes apparent that the treatment of anæmic mothers is the first important step in the prevention of iron deficient anæmia in the infant.

R	Ferri et ammon. cit.	gr. 10
	Cupri sulphatis	gr. 1/64
	Syrupi simplicis	5 1/2
	Aque	5 1/2

A few drops gradually increased to one drachm 3 to 5 times daily are usually well tolerated. Doses much in excess of the above may be employed. Snelling<sup>16</sup> recommends doses from 60 to 120 grains daily, explaining that small amounts of iron and ammonium citrate will be changed gradually to ferrie chloride or the unavailable form by reducing substances in the diet, whereas with larger doses the proportion of ferrous salt is increased.

During the past decade clinical data have accumulated substantiating the use of the supple-

mental addition of copper to iron therapy, while a minority contends that copper does not seem to enhance the rôle of iron. Although copper is not a constituent in the formation of the hæmoglobin molecule its rôle as a catalyst is generally accepted. Elvehjem, and co-workers<sup>3</sup> were of the opinion that the addition of copper caused the hæmoglobin content to rise more rapidly and to reach a higher level. They felt that there was ample evidence to prove that iron was incapable of raising the hæmoglobin to the average level, and inferred that supplemental copper was necessary to stimulate an optimum response. From experimental and clinical evidence one must conclude that copper still deserves recognition in the treatment of nutritional anæmia of infancy.

**Ferrous vs. ferric compounds.**—Although iron and ammonium citrate and similar compounds have been used with success ferrous preparations have been advocated in recent studies. It is believed that only iron in the ferrous state is absorbed from the intestinal tract, its effectiveness depending on the liberation of ferrous ions. Further, iron in the hæmoglobin molecule is present in the ferrous form. However, there are certain disadvantages accompanying the use of ferrous salts. The most significant is the readiness with which they deteriorate when in solution. The advantages on the other hand lie in their ease of absorption, rapid response, and smaller dosage.

The effectiveness claimed for ferrous salts is clearly brought forward when we consider the following table as originally compiled by Witts (See Table I). The percentage utilization of

TABLE I.			
Preparation	Effective daily dose, grains	Iron content, mg.	Utilization of iron, percentage
<i>Metallic:</i>			
Reduced iron .....	20-90	1,200-5,000	0.5-2
<i>Ferrous:</i>			
Ferrous chloride .....	4-8	100-200	12.5-25
Ferrous sulphate .....	9-12	180-240	14.0
Ferrous carbonate (as Bland's pill) .....	45-60	300-400	8.0
<i>Ferric:</i>			
Ferric ammonium citrate .....	60-120	800-1,600	1.5-3
Greater utilization with ferrous compounds considered advantageous—Haden. <sup>5</sup>			

ferrous chloride, ferrous sulphate in comparison with iron and ammonium citrate, is clearly demonstrated.

Syrup of ferrous chloride is favoured on account of its rapid effect and utilization. It is not a palatable preparation, and cannot be

placed in milk feedings because of curdling. It also deteriorates in a few weeks, approximately a month. Lucas and Summerfeldt<sup>8</sup> in a recent work used soluble ferrous chloride with added copper.

Ferrous sulphate. Parsons<sup>12</sup> was inclined to feel that ferrous sulphate was the most efficacious. He recommended the following prescription to be given three times daily.

R	Ferrous sulphate	gr. 4
	Water	q.s.
	Simple syrup	dr. 2

Josephs,<sup>6</sup> again citing from his excellent monograph, stated that the greater value of ferrous iron has not yet been demonstrated in anæmia of infancy. In keeping with this statement Stephenson<sup>17</sup> compared a group of infants using a daily dose of 30 grains of iron and ammonium citrate (340 mg. metallic iron) to controls who were each given 6 grains of ferrous sulphate (about 78 mg. metallic iron). In her work she suggested that ferrous iron in the above dosage was a little more quickly effective than the ferric, and concluded that the ferrous iron proved to be as effective as the ferric.

The saccharated ferrous carbonate is widely used. It may be conveniently prescribed in tablet or powder, given in milk, cereal, or fruit juices, the latter form being the least expensive.

**Available iron vs. total iron content.**—Although iron is to be considered foremost in the treatment of nutritional anæmia, dietary changes are essential. An over-indulgence in milk is curtailed. The timely addition of solid food must be introduced in the light of recent clinical and experimental evidence. Some interesting facts have been lately disclosed concerning the availability of iron in various food stuffs. One of the most recent and frequently quoted works is that of Summerfeldt.<sup>20</sup> Incidentally it was pointed out that as much as 25 to 50 per cent of the soluble iron in food goes into solution in the cooking water and is lost. This point is of great practical value.

A similar work on the availability of iron, using a different method, was later published by Kohler and his associates.<sup>7</sup> Such works are revolutionary and of utmost importance. In future, iron-containing foods will be assessed from the amount of soluble iron and not from the total iron content as heretofore.

**Value of solid food in nutritional anæmia.**—Is the early introduction of solid food an aid in the

prevention of anaemia of infancy? Monypenny<sup>11</sup> has found that the addition of egg, pabulum, and canned sieved vegetables at one month of age did not increase the weight or haemoglobin during the first five months over and above the values obtained in infants receiving milk mixtures alone. In keeping with this, it is claimed by experienced clinicians that the too early introduction of solid food is a factor resulting in gastro-intestinal disturbances encountered in later childhood. Elvehjem *et al.*,<sup>2</sup> and associates show that their low haemoglobin values recorded during the first 6 months were not prevented to any appreciable extent by the feeding of an adequate diet of natural foodstuffs; however, the haemoglobin values of children on the special diet began to increase at an earlier age.

Again in regard to early vegetable feedings we have the opinion of Schultz<sup>14</sup> and his associates. Their data indicated that the influence of vegetable feeding on mineral retention including iron was negligible in the case of the very young infant. Any favourable effect that vegetable feeding may produce must be attributed to such factors as vitamin content and others still unknown. Balanec experiments by the same authors revealed that anaemic infants were not able to utilize the iron of spinach.<sup>15</sup>

Cereal usually constitutes one of the early additions to the diet. Pabulum contains minerals, vitamins and iron in available form. Its use has resulted in a marked increase in haemoglobin in normal children, as reported by Ross and Summerfeldt.<sup>13</sup>

Tisdall and his associates<sup>21</sup> found the nutritional value of spinach was greatly over-rated, and stated that cooked spinach and canned tomatoes were approximately of equal value as a source of iron for the prevention and cure of nutritional anaemia, despite the fact that spinach contained three times the total iron content of tomato. This can be explained on the basis that cooked spinach as ready to serve and canned tomatoes contain the same amount of soluble iron for haemoglobin formation.

Liver was considered not so long ago as having little or no effect on the secondary anaemias. The evidence is now strongly in favour of liver as being one of the most important foods in its prevention and treatment. Its protein, iron and copper content, and possibly unknown factors, are responsible for haematopoiesis and haemoglobin synthesis. Liver extract is now being used

in some of the larger clinics. Cooley<sup>1</sup> preferred whole liver extract to the so-called "secondary" extract.

From the aforementioned data we must not be over-expectant of haemoglobin regeneration from the too early addition of foods presumably rich in iron. This evidence strongly emphasizes that iron still constitutes our most effective weapon in the prevention and treatment. An absolute increase in haemoglobin necessitated by growth and general metabolism can be more satisfactorily fulfilled by the proper administration of iron.

*Vitamins.*—The rôle of vitamins has been the object of much clinical investigation. Summerfeldt and her co-workers<sup>19</sup> have shown that the vitamin B complex incorporated in a special cereal and biscuits increased the haemoglobin content of normal children. Liver and some liver extracts are high in this vitamin. The addition of other vitamins are not specific but contribute to the general well being so essential to optimum haematopoiesis. Sunshine undoubtedly plays a part but ultra-violet irradiation has not gained a reputation in either the prevention or cure of the nutritional anaemia of infancy.

*Transfusion.*—A word about the part played by transfusion is of course indispensable. Infants with severe degrees of anaemia should receive one or more transfusions as the patient's ability to combat infections is materially reduced, and this defect is often disastrous. Transfusion should be given for a rapid response, thus providing extra resistance and stimulating bone-marrow production. Transfusion when given early to markedly anaemic infants in severe infections as pneumonia is often a life-saving measure.

#### SUMMARY

1. Physiological anaemia was uninfluenced by iron medication.
2. Early antianaemic therapy prevented depletion of iron reserves.
3. Treatment of anaemic mothers aided in the prevention of anaemia in the infant.
4. Iron constituted our most effective weapon in combating nutritional anaemia.
5. Large doses of ferrie salts with copper were used effectively.
6. Ferrous compounds proved to be as effective as the ferrie.
7. Iron-rich foods were assessed from the amount of soluble iron available.



8. Solid food was inadequate as a source of iron for hæmoglobin regeneration.

9. Transfusion was considered advisable in severe grades of anæmia.

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## UPPER ABDOMINAL PITFALLS: DIFFERENTIAL DIAGNOSIS AND SURGICAL TREATMENT\*

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MY attention was attracted to the importance of this subject by the sudden death of a colleague after a short history of recurring attacks of upper abdominal pain. Three eminent cardiologists proclaimed his heart not at fault. One surgeon diagnosed gall-bladder disease. On the same day that he died from coronary thrombosis I saw in consultation a man who had been in bed five weeks with what was thought by a very competent medical man to be coronary thrombosis. The day I saw him his gall bladder had ruptured into the free peritoneal cavity as a result of gangrene due to five weeks' obstruction of the cystic duct. These two cases serve to illustrate the difficulty in differentiating between the symptoms of extra and intra upper abdominal disease, and also the tragedy that attends improper treatment. The first responsibility is to exclude extraperitoneal and other non-surgical lesions that produce acute upper abdominal symptoms.

Some of the greatest tragedies encountered in practice occur in the upper abdomen. Great care must be exercised to differentiate between intra- and extra-peritoneal disease, for if an abdomen be opened by mistake when extra-peritoneal disease is present, death may result; on the other hand, procrastination in the face of intraperitoneal disease demanding surgery will increase the mortality.

The increasing incidence of heart disease, especially coronary thrombosis, has made the profession very much on the alert to recognize it. Dr. J. Oille<sup>s</sup> in a recent article on coronary thrombosis stated: "The mistakes that are made now are the reverse of those made ten to fifteen years ago. Then, coronary thrombosis was not diagnosed when it should have been, now, it is diagnosed frequently when it should not be, in cases that obviously have pain due to gall bladder or other abdominal origin." The cardiac area for pain includes the epigastrium, and heart disease, therefore, frequently causes upper abdominal symptoms from pain originating in the heart muscle itself, from passive congestion of the spleen and liver, or from emboli thrown off by the heart and lodging in the vessels of the upper abdomen.

The early symptoms of heart disease often cause patients to believe that they are suffering from indigestion. In early coronary disease characteristically the patient is able to exercise on an empty stomach without distress, while the same amount of exercise undertaken after eating, or particularly overeating, causes distress or pain often located in the epigastrium and radiating up the sternum into the neck and often the teeth. This distress is variously described as a "choking sensation", "pressure pain", "squeezing or filling up", or a feeling of "gas on the stomach", and when relieved by belching the patient is more convinced than ever that it is due to indigestion. Soda very

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often gives that type of patient more relief than nitroglycerine, and since Butch, McGowan and Walters<sup>1,2,3</sup> have shown that nitroglycerine will relieve the pain of gall-stone colic and common-duct spasm, it has greatly added to the physician's responsibility in these already difficult cases. Many of these patients have discovered that the attacks are less frequent if they adhere to a light diet of easily digested foods.

Emboli lodging in abdominal organs produce clinical pictures which may mimic almost any acute surgical disease of the abdomen, and should always be considered, particularly in cases with an abrupt onset and a marked degree of shock. I have seen one patient operated on for an acute appendicitis and another diagnosed as having renal calculus because of a mesenteric embolism. Pleurisy is a frequent diagnosis following infarction of the spleen. Acute pancreatitis or acute intestinal obstruction are often suspected when the mesenteric vessels become occluded.

The abdominal crises of lead poisoning, the gastric crises of tabes dorsalis, diaphragmatic pleurisy, and incipient or central pneumonia can mimic upper abdominal intraperitoneal disease, and must always be excluded before a diagnosis of intraperitoneal disease is made. A carefully-taken history and a complete physical examination which includes an analysis of the blood and urine should be given every patient presenting acute abdominal symptoms, and an electrocardiographic examination, certainly, if in doubt of the cardiac origin of the pain. Dr. Oille advises keeping the patient in bed three or four weeks if in doubt as to the cardiac origin when no electrocardiograph is available.

If we are able to exclude extraperitoneal disease we are faced with the problem of making a correct pre-operative diagnosis of an intraperitoneal lesion. This is often almost impossible, and delay must be avoided if we are to lower the mortality rates attendant upon these conditions. Every hour of delay increases the mortality of perforated ulcer, for example, and allows the rapid progression of pathological changes in the gall bladder. Fortunately, the same incision will permit the surgeon to deal with any lesion found in the upper abdomen.

*Perforated peptic ulcer.*—The diagnosis of perforation is usually easy, the long history of periodic attacks of indigestion, relieved by food

and soda, indicating the presence of peptic ulcer. However, perforation may occur as the initial symptom in a few cases. The pain comes on suddenly as a rule, and is of such severity that the victim is "dropped in his tracks". Nausea is present but only about 40 per cent of these patients vomit. Shock at first is present to a marked degree, evidenced by cold, clammy skin with beads of perspiration on the brow; rigidity is early, board-like, and in the vast majority of cases remains after the initial shock passes off, which may be from a few minutes to an hour, then the patient is able to get up and walk in relative comfort. This is the stage when the physician first sees him, and the unwary may easily be misled by the comfort of the patient, the calm expression, normal temperature and pulse, and, in a few cases, the board-like rigidity may be absent or doubtful, but a careful history and abdominal examination will bring out that trinity of symptoms and physical findings enumerated by Graham<sup>4</sup> which are indicative of an intraperitoneal tragedy, namely, the association of pain and tenderness; one point of maximum tenderness; aggravation of the distress if the patient turns over in bed. With perforation, the pain is very often diffuse but, if they are not too shocked, many patients will complain of the greatest amount of pain in the epigastrium to the right of the mid line, and their distress is increased by turning over.

Differential diagnosis deals mostly with (1) acute appendicitis; (2) acute hæmorrhagic pancreatitis; (3) coronary thrombosis; (4) mesenteric thrombosis; and (5) acute cholecystitis.

*Appendicitis* may be simulated by the duodenal contents running down the right paracolic gutter, collecting in the right iliac fossa, and causing local symptoms.

Atypical *coronary thrombosis* can simulate an acute abdominal disaster very closely, but the onset of pain is more insidious than that of perforation, and it radiates up over the left chest; rigidity, if present, is very slight; there is no point of maximum tenderness; the pain and tenderness are not associated, and pain is not increased by turning in bed. Conuell<sup>5</sup> states that one of the most valuable differential points is the presence of dyspnoea, which is uncommonly found in abdominal lesions.

When perforation is present these patients very seldom reach hospital in less than six hours; mortality increases rapidly as time passes. Pa-

tients are often admitted in very poor physical condition to stand an anæsthetic and laparotomy, and any delay after admission to administer fluids, such as glucose, blood, etc., is well compensated for by the improved condition of the patient.

Spinal is the anæsthesia of choice in these cases, since it produces a quiet abdomen and lessens thereby the spread of the duodenal contents. At this operation saving the patient's life is our only responsibility, so the leak is closed as quickly and with as little trauma as possible, and no effort made to deal with the ulcer. I have used Graham's method of closing an ulcer for some time and have found it very satisfactory. Three interrupted sutures tied over an omental fat graft covers the hole. Drainage is not necessary unless gross necrosis is present, because cultures taken from the abdomen in the first twelve hours are either sterile or show avirulent organisms.

*Acute pancreatitis.*—This is a rare disease and no surgeon ever meets with many cases. The condition is seldom diagnosed until the abdomen is opened. Fitz's classification of gangrenous, hæmorrhagic and purulent types may only relate to a matter of degree, but nevertheless each has a very distinct clinical picture, corresponding with their pathological varieties, according to Walton.<sup>9</sup> The average age is 40, usually stout subjects with a past history of milder attacks. These former attacks may have been caused by milder degrees of pancreatitis or have been due to gall stones, with which condition pancreatitis is very commonly associated. Differential diagnosis from perforated ulcer, acute intestinal obstruction, and intra-peritoneal infection is necessary.

With the gangrenous type the pain is sudden, agonizing and continuous, so severe that the patient may faint, and in this respect resembles perforation. Vomiting is continuous without relief. Pain is deep in the epigastrium and soon may pass to the left shoulder. When medical aid arrives the patient is usually in a state of profound collapse, rapid pulse, subnormal temperature, cold, clammy skin with a certain amount of cyanosis, a phenomenon which has never been explained. This picture resembles perforation but the characteristic board-like rigidity is absent. There is deep tenderness in the epigastrium, but no distension is present in the early stages. If allowed to go on, death ensues in two or three days.

The hæmorrhagic type is the most common.

It resembles obstruction more closely, with cramping pains across the upper abdomen, continuous vomiting of dark brown material less faecal in character than that found with obstruction. Distension is less, but more tenderness is usually present than with obstruction. Constipation is not so complete.

*Acute cholecystitis.*—This is an acute manifestation of a chronic condition, and in 95 per cent of cases is caused by calculous obstruction of the pouch of Hartman or cystic duct. It commences with sudden pain, which, in typical cases, is located in the epigastrium or right hypochondrium, and radiates either around the right costal margin or straight through to the back under the right shoulder blade or mid-scapular region, in other words, the classical pain of gall stone colic.

If the patient is not too sick, a history can usually be obtained of a long, continuous, day by day, flatulent type of dyspepsia, essentially one of intolerance to three types of food, fats, coarse vegetables, and sour fruits, as pork, boiled cabbage, raw apples. This distress comes immediately after meals in contra-distinction to the midmeal distress of ulcer. A history of painful episodes located in either the epigastrium or right upper quadrant can often be obtained, ranging from transient mild discomfort to the agonizing colic induced by the migration of stones. In typical cases the diagnosis is not difficult, but the localization and radiation of pain may not always be so striking. Pain may be felt in the left hypochondrium or in the sternum, and it is possible to have a marked degree of cholecystitis without dyspepsia. Cases exhibiting such atypical symptoms simulate coronary thrombosis and angina very closely and diagnosis will often have to wait corroborative evidence; possibly only an electrocardiogram will decide the issue, and then not always.

Gall-stone colic subsides spontaneously or is soon relieved by a hypodermic of morphine. The difficulty in differentiating between angina pectoris and gall-bladder pain is increased since Butch, McGowan and Walters have demonstrated the relief of gall bladder and common duct pain with amyl nitrite. They also demonstrated an increase in common-duct spasm and pain by administering morphine. If, however, a stone becomes impacted in the pouch of Hartman or the cystic duct the symptoms of biliary colic will soon pass into the characteristic symptoms of acute cholecystitis; vomiting soon follows but gives little relief; the temperature rapidly rises

to 102 or 103°; there is constant severe pain in the right hypochondrium which radiates over the epigastrium and often down the right iliac fossa and through to the back. When a stone becomes impacted in the pouch of Hartman or cystic duct the flow of fluid from the gall bladder is stopped and the venous and lymphatic circulation is also mechanically obstructed; marked œdema of the gall bladder occurs followed by gangrene and perforation in a much higher percentage of cases than is generally believed. Bacteria play no part in this early condition, even though the temperature may rise to 102° with a leukocytosis of 15,000. Reports from many observers show sterile cultures in a very high percentage of these cases.

#### DIFFERENTIAL DIAGNOSIS

Acute obstructive appendicitis, leaking peptic ulcer, acute pancreatitis, perinephritic abscess and coronary thrombosis are the conditions that must be taken into consideration in making a diagnosis.

In the early stages, pain and tenderness are diffuse and there is a widespread rigidity, but with careful palpation it is generally possible to determine that the physical signs are more marked in the right hypochondrium than in the right iliac fossa, the rigidity is not so board-like as with ruptured ulcer. The past history of a continuous type of flatulent dyspepsia is different from that in the periodic attacks of indigestion so characteristic of ulcer. There is rarely the same tenderness or rigidity of the recti muscles with perinephritic abscess, and if a tumour is present it can generally be felt to pass back into the loin and does not move on respiration. The same past history will be present with pancreatitis, but very little tenderness and rigidity are present. Connell states that: "Cardiac pain may suggest gall-bladder disease (either gall-stone colic or suppurative cholecystitis) more likely coronary thrombosis than angina pectoris." He also states that, "Patients with undoubted gall-bladder involvement have attacks of coronary thrombosis far too frequently for the association to be coincidental."

Until about five years ago the profession was generally in accord with the belief that a gall-bladder operation never became an emergency, but today the opposite view is being entertained by most surgeons. According to Heuer,<sup>6</sup> 20 per cent of acute gall bladders become gangrenous. Alexander<sup>7</sup> reported 20 cases of ruptured gall

bladder, 60 per cent of which were localized, and 40 per cent ruptured free into the peritoneal cavity. Immediate operation is advocated to prevent gangrene, and also because the removal of the gall bladder is made easier at this early stage due to the subperitoneal œdema surrounding the viscus.

My experience of handling 51 cases of acutely obstructed gall bladders, in patients ranging in age from 17 to 77 years, with only one death, the only case that was not operated on early, along with a review of the literature, have convinced me that the primary pathological lesion in the "acute gall bladder" is not a septic process but an interference with the blood supply to an intraperitoneal viscus, caused mechanically in 95 per cent of cases by a stone impacted in the cystic duct, and if this obstruction is relieved before infection sets in, the present mortality can be greatly reduced, a higher percentage of complete cures can be assured, because it has been shown that cholecystectomy can be done much more often in the early stage than later. Less suffering before the operation can be promised, and at least one week's shorter stay in hospital after a cholecystectomy than after drainage. Each case, of course, demands individual consideration as to optimal time for operation, but, in my experience, symptoms resulting from a gall bladder obstructed for two days or more will not subside completely under any treatment except operation.

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#### RÉSUMÉ

Dans les syndromes abdominaux supérieurs il est de toute nécessité de rechercher si l'agent causal est extra ou intrapéritonéal afin d'intervenir utilement s'il y a lieu. Les organes de la cavité thoracique seront interrogés minutieusement car les plèvres, le cœur et les vaisseaux thoraciques sont souvent le siège de syndromes simulant une maladie abdominale. L'ulcère peptique perforé est facilement reconnu par la triade de Graham: douleur; localisation de la sensibilité maxima en un point fixe; exacerbation de la douleur si le malade se retourne dans son lit. Au cas de perforation la douleur

a son maximum à l'épigastre, à droite de la ligne médiane. Le diagnostic différentiel se fera surtout avec l'appendicite aiguë, l'hémorragie du pancréas, la thrombose coronarienne, la thrombose mésentérique et la cholécystite aiguë. Voici les éléments principaux du diagnostic: les signes appendiculaires (d'emprunt) ne surviennent qu'au cas de perforation de l'ulcère; la dyspnée n'est pas fréquente dans les lésions abdominales;

les affections aiguës du pancréas sont très douloureuses et s'accompagnent de vomissements incessants; les affections de la vésicule biliaire s'apparentent davantage à la crise de colique hépatique et ont une longue histoire de malaises antérieurs. Ajoutons que dans l'appendicite aiguë la rigidité musculaire est moins marquée que dans l'ulcère perforé. Les affections aiguës de la vésicule biliaire doivent être opérées sans tarder. JEAN SAUCIER

## COMBINED NUPERCAIN SPINAL AND CYCLOPROPANE ANÆSTHESIA\*

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THE anæsthetist is called upon to serve two masters, the surgeon and the patient, and particularly is this the case when the operative site is in the upper abdomen. The surgeon demands, and has the right to expect, the maximum relaxation obtainable without unduly increasing the hazards of the operation, while the patient demands, and likewise has the right to expect, the minimum of discomfort preceding and during the operation. Service with safety to the patient is the aim of both surgeon and anæsthetist, and this aim is not fulfilled when the surgeon has to obtain adequate exposure only by virtue of the strong arms of his assistants, nor is it fulfilled if the desired relaxation is obtained at the risk of greatly increased operative and post-operative complications. Surgery of the upper abdomen, while it constitutes a relatively small number of cases, less than 5 per cent of those performed in a large city hospital, does present the greatest difficulty from an anæsthetic standpoint. It is our contention that the technique to be described, namely, combined nupercain spinal and cyclopropane anæsthesia, is of particular value in this group of cases, and thus has a very definite place in the armamentarium of the trained anæsthetist.

To facilitate the surgical problems in the upper abdomen the ideal anæsthetic is the "perfect spinal". By a perfect spinal one implies a placid patient, free of mental or physical distress, and a relaxed abdomen with contracted intestines and quiet respirations, followed by an uncomplicated convalescence. This we can obtain in the majority of cases with spinal anæsthesia alone. It is the minority of cases that provide plenty of grief for surgeon and anæsthetist alike. Nor can the inadequate spinal be made adequate by the proverbial "whiff" of

gas. When painful stimuli are evoked at any stage of an operation being performed under spinal anæsthesia it is essential that the anæsthetist proceed with the inhalation agent as though nothing had been used, and, further, it is essential that all manipulation in the abdomen cease until such time as full surgical anæsthesia is obtained.

Total spinal anæsthesia may be unsatisfactory for any one of a number of reasons.

1. In the nervous or apprehensive patient it is rarely possible to avoid psychic shock if the patient knows an operation is being performed, and many of these will insist on being put to sleep before the incision is made. The use of basal anæsthetics, such as rectal avertin or intravenous barbiturates, or of heavy sedatives, with the associated respiratory depression, has no place in surgery of the upper abdomen.

2. A carefully calculated and administered dosage of a known anæsthetic drug may fail to reach a segment of the spinal cord high enough to anæsthetize the whole of the operative area. Or, motor anæsthesia and relaxation may be adequate, without associated sensory anæsthesia. This latter is particularly apt to occur when a dilute drug such as nupercain in 1:1,500 solution is used.

3. Retching and vomiting, caused by a too high spinal, or by a gall-bladder rest, or by tight packs up against the diaphragm, or by traction on viscera, may be so persistent as to increase the surgeon's difficulties materially. This can be controlled adequately only by the addition of an inhalation anæsthetic.

4. Operations in the upper abdomen are frequently quite prolonged, so that the effect of the spinal anæsthesia wears off, causing distress to the patient as well as to the surgical team.

5. When oxygen administration is indicated during an operation performed under high spinal anæsthesia, with a conscious patient, the

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presence of the mask over the face gives rise to some discomfort and complaint from the patient unless a small amount of an anæsthetic agent is added. Rather than risk an inadequate spinal the tendency is to give the maximum dose, thereby increasing the danger of the anæsthetic.

The technique which I wish to present to you has been used for the past three or four years by all the members of the anæsthetic staff of the Toronto Western Hospital, and consists of the spinal injection of a minimum dose of nupercain, 1:1,500 solution, followed by the induction and maintenance of light cyclopropane anæsthesia, which is undertaken before the surgical preparation is commenced.

The usual premedication given has been nembutal, gr.  $1\frac{1}{2}$ , on the night prior to operation, with morphine gr.  $\frac{1}{8}$  to  $\frac{1}{4}$ , and scopolamine gr. 1/300 to 1/150 one hour before operation. If the operation is slated for the latter part of the morning it may be of advantage to repeat the nembutal two hours before operation. The scopolamine used is in solution, in ampoules containing gr. 1/150, in which form it would seem to be more stable than in tablets. Our experience confirms this since we at the Western Hospital have used some 7,000 to 8,000 ampoules for this purpose without a single case of cerebral irritability such as occasionally followed the administration of scopolamine (or hyoscine) in tablet form.

The nupercain used is the 20 c.c. ampoule of 1:1,500 solution in 0.5 per cent saline, which has a specific gravity of 1.003, and is therefore hypobaric, or lighter than spinal fluid. With the patient in the anæsthetic room, in the lateral position, the skin over the lumbar spine is prepared with iodine and alcohol, and the space between the second and third lumbar vertebrae is infiltrated with 0.5 per cent novocain to which has been added ephedrin, gr. 1. A 20 c.c. Luer-Lock syringe is rinsed with 1 to 2 c.c. of nupercain, to be sure of getting rid of any alkali which might precipitate the nupercain, and then is loaded with the desired dose of the drug. Spinal puncture is done with a 22-gauge needle (rarely with a 20- or 21-gauge) and the injection is made without removal of spinal fluid and without barbotage. The patient is then turned on the face with a small pillow under the costal margin. After five minutes in this position the patient is turned on the back and induction of anæsthesia with cyclopropane carried out, the desired depth of anæ-

thesia being in the lower first plane. When the induction is complete the surgical preparation and operation are proceeded with.

The usual dosage of nupercain is from 8 to 12 c.c., the average in our series being 11.0 c.c., as opposed to an average of 14.6 c.c. in total spinal cases. The concentration of 10 to 20 per cent cyclopropane in oxygen ensures at all times against oxygen want.

Nupercain would seem to have very definite advantages over other spinal anæsthetic agents, in combination with cyclopropane. In our experience the anæsthesia resulting from it is much more consistent and more uniform; when anæsthesia is deficient the deficiency is invariably sensory rather than motor, which deficiency can readily be controlled by cyclopropane; the duration of motor anæsthesia produced by nupercain is more than double that obtained with procaine or allied drugs; because of the 1:1,500 solution being hypobaric the use of a kidney or gall bladder rest, or of the Trendelenburg position, increases the anæsthesia in the desired area; as evidenced by fall in blood pressure, nupercain is less toxic than other spinal agents.

It is my purpose to present a review of 226 upper abdominal operations with anæsthetics administered by, or under the direct supervision of, the staff in anæsthesia of the Toronto Western Hospital. The operations performed include gastric resections and anastomoses, cholecystectomies, and others as shown in Table I.

TABLE I.  
226 UPPER ABDOMINAL OPERATIONS

Cholecystectomy .....	114
Gastrectomy and gastro-enterostomy .....	45
Bowel resection .....	42
Perforated ulcer .....	19
Splenectomy .....	5
Diaphragmatic hernia .....	1

For purposes of comparison those cases were not included where drugs other than nupercain were used for spinal injection.

In Table II these cases will be seen under the various anæsthetic techniques employed.

The major complications included atelectasis 6, pneumonia 5, pleurisy with bronchitis 1, pulmonary œdema 1, embolus of popliteal artery 1, hemiplegia. Peritonitis and wound infections have not been listed. As will be seen, ether was commonly used in shorter and simpler cases which were more suitable for the teaching of

anæsthesia to junior interns and students. No operative procedure in this series took longer than three hours. No deaths occurred on the table, and the deaths listed were confined to those which might be associated, directly or indirectly, with the anæsthesia. The causes of death included pneumonia, shock, massive collapse with peritonitis, and pulmonary emboli.

Since respiratory depression is always present from the combined effect of sedatives, anæ-

2. An outline of a technique in use at the Toronto Western Hospital has been given.

3. A review of 226 upper abdominal operations under ether, spinal alone, supplemented spinal, and combined nupercain, spinal and cyclopropane anæsthesia has been presented.

4. By employing a combination of nupercain spinal anæsthesia in minimum dosage with light cyclopropane inhalation anæsthesia certain of the disadvantages of other types of anæsthesia

TABLE II.

Technique	No. of cases	Average operative time hrs.	Average dose nupercain c.c.	Major complications percentage	Mortality percentage
Ether .....	63	1.2		4.8	3.2
Spinal .....	41	1.4	14.6	7.3	4.8
Spinal (supplemented) ...	27	1.8	14.5	22.2	3.7
Combined .....	95	1.6	11.0	4.2	2.1

thesia, and the operation, some measures to prevent post-operative pulmonary complications should be employed. Before leaving the table we make a practice of replacing the oxygen and cyclopropane in the alveoli by hyperventilation with air from the gas machine. When the patient is returned to bed orders are left for postural changes every hour, and, where indicated, for the administration of carbon dioxide and oxygen every two to four hours.

A fairly large proportion of the surgical cases under discussion may be classified as doubtful or poor risk patients. It is in these groups that the combined technique is of particular value. The technique may be employed in any case where either spinal alone or any inhalation anæsthetic could be considered, the only exception being the patient *in extremis*, when a minimum of operating under local anæsthesia should be performed. Nor do we feel that the advantages of the combined technique should be denied to the good risk patient. While our discussion has been confined to the relatively small group of upper abdominal operations, which are the "problem children" of the anæsthetist, this technique has been widely used in other abdominal surgery, as in hysterectomies and appendicectomies, with equally gratifying results.

#### SUMMARY

1. A review has been made of the essentials in the administration of anæsthesia for surgery of the upper abdomen.

are avoided. Psychic and spinal shock are greatly reduced, and adequate relaxation for upper abdominal surgery is obtained in a high percentage of cases.

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#### RÉSUMÉ

Dans les opérations pratiquées au niveau du tiers supérieur de l'abdomen, l'anesthésie réalisée par la rachi nupercainique supplémentée par le cyclopropane nous paraît la meilleure, parce que la rachi seule peut ne pas toujours être suffisante pour plusieurs raisons. Voici les principales: un malade trop nerveux; la possibilité de ne pas analgésier les métamères trop élevés; les vomissements et les nausées; l'épuisement de l'effet analgésique. La méthode que nous utilisons depuis 4 ans paraît bonne. Elle consiste à injecter une dose minima de nupercaine et de compléter par un volume également très réduit de cyclopropane. 1½ gr. de Nembutal est donné la veille, et, avant l'opération, une injection de morphine (¼ à ½ de gr.) et scopolamine (1/300 à 1/150 de gr.). La nupercaine employée est l'ampoule de 20 c.c. de la solution à 1:1,500 en solution dans du sérum physiologique à 0.5 pour cent. En moyenne 11 c.c. suffisent. La concentration de cyclopropane varie entre 10 et 20 pour cent. Le malade est invité à respirer pendant quelques minutes de l'oxygène pur avant de quitter la salle d'opération. La seule contre-indication paraît être le cas de malades *in extremis* où la rachi seule est préférable.

JEAN SAUCIER



# DE L'ÉVOLUTION GÉNÉRALE DE LA SYPHILIS ACQUISE

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L'ÉVOLUTION générale de la syphilis, bien que souvent d'allure capricieuse, obéit néanmoins à certaines lois. Tout au début de l'infection ces lois sont même assez précises. Plus tard, selon les sujets et diverses circonstances, il y aura des variations dans l'évolution, la localisation, l'intensité, le pronostic et la réponse au traitement. Mais quelque soit le mode contamination, vénérien ou accidentel, quelque soit la localisation du point d'inoculation (génital ou extra-génital), la syphilis, du moins lors de ses premières étapes, adopte un rythme à peu près uniforme chez la plupart des sujets. Nous omettons certains cas spéciaux comme la syphilis récemment acquise chez la femme qui devient enceinte et d'autres éventualités (inoculation profonde, transfusion, etc.).

Contrairement à ce que l'on pensait autrefois, la généralisation de l'infection se fait presque immédiatement. Il y a quelques années encore, on croyait que la syphilis était devenue une maladie générale seulement à la période secondaire, lors de l'apparition des signes de dissémination que l'on aperçoit sur tout le revêtement cutané-muqueux. De nos jours, l'on sait par des expériences de médecine expérimentale que la généralisation des tréponèmes à tout l'organisme s'accomplit dans les quelques heures qui suivent la contamination.

Nous ne citerons que l'expérience de deux chercheurs américains, Brown et Pierce. Ceux-ci par injection intra-testiculaire syphilisent deux lapins. Le lapin No I est castré 48 heures après l'inoculation. Le lapin No II est gardé comme témoin. Si les tréponèmes sont restés cantonnés dans le testicule inoculé, le lapin No I qui a subi la castration ne présentera pas de signes de syphilis généralisée. Seul le lapin No II en offrira. Or dans les semaines qui suivent les deux lapins, le castré et l'intact, présentent tous deux à la même époque les mêmes signes de généralisation. De nombreuses observations recueillies en médecine humaine (comme l'excision précoce du chancre) ont donné des résultats superposables.

La généralisation de l'infection se fait donc presque immédiatement après l'inoculation: un groupe de tréponèmes pullule sur place, un second prend la voie sanguine et un troisième la

voie lymphatique. Le contact infectant est suivi d'une période de silence apparent, dite d'incubation, qui dure environ trois semaines. Rien encore indique extérieurement qu'il y ait eu contamination.

Puis au point d'inoculation apparaît la première manifestation clinique de la syphilis: c'est l'accident primitif, le chancre syphilitique. Au bout de huit, dix jours, se montre dans le territoire ganglionnaire voisin du chancre, l'adénopathie satellite. Le chancre laissé à lui-même évoluera durant deux mois environ, puis disparaîtra. Jusque vers sa fin, sa surface fourmille de tréponèmes. A peu près trois semaines après l'apparition du chancre, soit six semaines après l'inoculation, le sang qui était infecté depuis les premières heures mais qui n'en donnait aucune manifestation, offre des signes de laboratoire positifs de l'infection tréponémique. Ainsi les réactions de Wassermann, de Kahn, de Hinton, Bertrand et autres, qui étaient négatives deviennent positives vers la sixième semaine. C'est la brève période primaire sérologique qui commence. Avant l'apparition des réactions sanguines positives, il s'agissait de syphilis primaire pré-sérologique. Ces deux étapes de la syphilis primaire, pré-sérologique et sérologique, doivent retenir l'attention. Cette distinction est d'une grande importance pratique. En effet les malades traités dès la phase pré-sérologique guérissent plus sûrement et plus rapidement que les autres.

Environ trois semaines après l'apparition de ces réactions sanguines positives, soit neuf semaines après le début de l'infection, se termine la période primaire par l'explosion des accidents secondaires. Cette période secondaire éclate par l'apparition de lésions cutanées et muqueuses, de forme et d'aspect divers, abondantes, souvent généralisées à presque tout le tégument. En même temps que ces manifestations cutané-muqueuses apparaissent des signes indiquant une atteinte de l'état général: faiblesse, anémie, inappétence, insomnie, céphalée vespérale, etc.

Sans traitement ces accidents disparaîtront d'eux-mêmes en deux, trois mois, mais durant les deux, trois parfois quatre années qui suivent, il y aura le plus habituellement chez le syphilitique non traité ou insuffisamment traité, de

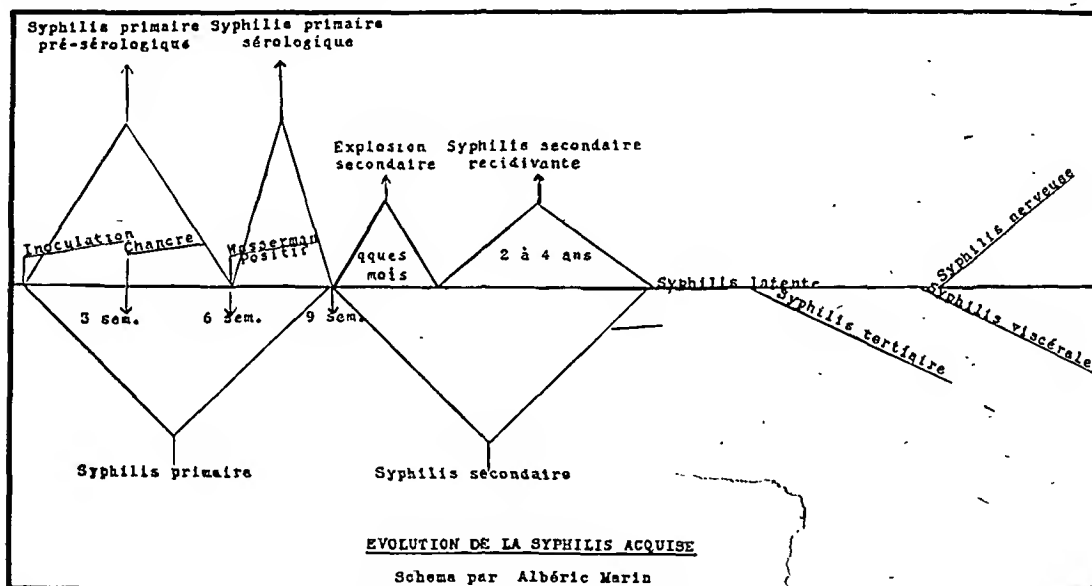


multiple récidives soit à la peau, soit aux muqueuses. Elles surviendront à des intervalles irréguliers, avec une intensité inégale. Les lésions muqueuses sont parfois très discrètes, peuvent passer inaperçues, surtout chez la femme mais sont éminemment contagieuses. En réalité, c'est par l'intermédiaire de ces petites érosions muqueuses, d'allure insignifiante que s'opère le plus grand nombre de contaminations. C'est la syphilis secondaire récidivante. A partir de la quatrième année, parfois avant, la maladie entre dans une phase de latence.

Dès ce moment diverses éventualités surviennent. La syphilis latente peut durer toute la vie, sans donner d'autres signes que des réactions sérologiques positives. Il s'agit alors de syphilis bénigne qui permet à l'individu de

stituer un chapitre important de la pathologie humaine. Celle-ci s'installe insidieusement, ne donnant au début que des malaises vagues. Ce n'est souvent qu'au bout de dix, vingt ans, que des signes caractéristiques d'atteinte viscérale (cardiaque, aortite, etc.) s'installent.

Ou bien encore, la syphilis s'insinuera du côté du système nerveux central et complication redoutable, causera les désastres que l'on connaît : la syphilis cérébrale, la paralysie générale, le tabès, la tabo-parésie, la syphilis méningo-vasculaire. En réalité si les signes cliniques de syphilis nerveuse font une apparition tardive, (dix, vingt ans après le chancre) les signes sérologiques (liquide céphalo-rachidien positif) sont décelables par la ponction lombaire le plus habituellement vers la quatrième année. Cette



vivre jusqu'à un âge assez avancé. Mais le plus souvent, après une période de syphilis latente indéterminée, des échéances graves plus ou moins éloignées surviennent. Au bout de cinq, dix, vingt ans et plus, peuvent se montrer des accidents tertiaires à la peau ou aux muqueuses. Ils évoluent durant des mois, des années, disparaissent et reviennent. Profonds et mutilants, ils réalisent des dégâts parfois très étendus, des infirmités irréparables.

Indépendamment de ces accidents tertiaires cutané-muqueux, et qu'ils se produisent ou non, il est possible que la syphilis tardive accomplisse une œuvre sournoise et plus grave. Elle attaque certains viscères importants, notamment l'appareil cardio-vasculaire; des affections cardiaques souvent mortelles s'installent avec une grande fréquence. Cette syphilis viscérale con-

stitue un chapitre important de la pathologie humaine. Celle-ci s'installe insidieusement, ne donnant au début que des malaises vagues. Ce n'est souvent qu'au bout de dix, vingt ans, que des signes caractéristiques d'atteinte viscérale (cardiaque, aortite, etc.) s'installent.

En effet, la période pré-clinique ou purement sérologique de la syphilis nerveuse dure cinq, dix ans, parfois davantage. Cette syphilis nerveuse asymptomatique sera suivie de signes cliniques évidents. Elle se manifestera par l'un des grands syndrômes énumérés plus haut.

Voilà, dessinées à grands traits, quelques notions concernant la pathologie générale et l'évolution de l'infection tréponémique.

Afin de les résumer dans un raccourci visuel, nous avons imaginé le schéma ci-dessus.

Nous avons cru utile de le publier, parce qu'il nous semble assez bien illustrer par un diagramme en quelque sorte mnémotechnique, la marche générale de cette maladie avec ses tangentes variées.

## A TEST FOR ACTIVITY IN PULMONARY TUBERCULOSIS\*

(A STUDY OF TWO HUNDRED CASES)

By S. H. MARTIN, M.D., C.M.(QUEEN'S)

*Professor of Clinical Medicine, Severance Union Medical College,**AND P. S. YU, M.B., Assistant in the Department of Medicine,**Seoul, Korea*

DR. MEDLAR describes the leucocytic picture as our nearest approach to the tuberculous lesion in the living body. Recent knowledge of the value of the leucocytic blood picture comes to us mainly from such workers as Arneth,<sup>1</sup> Schilling,<sup>1</sup> Cunningham,<sup>2</sup> Sabin,<sup>3</sup> Medlar,<sup>4</sup> Wiseman,<sup>5</sup> and others, the former in the demonstration of the status of the lesion, and the latter emphasizing the monocyte-lymphocyte ratio and its clinical significance.

From the work done by the above-mentioned we know: (1) That with active tuberculous lesions there is an increase in the young forms of the neutrophils and in the monocytes, a decrease in the large and small lymphocytes, and the eosinophiles disappear. In many of these studies it has been found that the clinical and blood pictures generally agree. (2) In cases showing clinical improvement or arrest the total number of leucocytes is down, the monocytes which are associated with new tubercle formation, and the neutrophils, especially the younger forms, are decreased, and lymphocytes predominate in the healing picture.

At first, we used the Arneth and then the Schilling method of count, and with the data, using the neutrophils, monocytes and lymphocytes, we made a working ratio  $M+N/L$ , and used this with tuberculin to test moderately active cases, using as a control x-ray films, physical signs, and the red cell sedimentation rate. In our pneumothorax cases it was found that the  $M+N/L$  ratio, which we called the L.A.R. (leucocytic activity ratio) ran a curve parallel to that of the sedimentation rate. Medlar reports such sedimentation rate control of pneumothorax cases.

In order to produce a minimal amount of controlled tuberculous reaction to stimulate the leucocytic shift, we used, in conjunction with the L.A.R., old tuberculin, a gift from Dr. Baldwin, of Trudeau Sanatorium, using 0.05 c.c.

of a 1:1,000 fresh solution. It was given by the Mantoux method, the bleb being twice as large as in the usual Mantoux test. A 1:10,000 solution is used for children.

We made blood counts every four hours in tuberculous and non-tuberculous cases, and found the greatest leucocytic reaction 24 hours after the tuberculin injection.

For a standard control we tested thirty apparently healthy nurses, and found all who had been in training over one year showing a slightly positive reaction and an inactive drop to a point below 2 after the second  $M+N/L$  reading, twenty-four hours after the Mantoux injection.

Of four negatively (tuberculin) reacting nurses, probationers from last year, three had become tuberculous, and one had become slightly positive, with a negative x-ray film.

Many of the former negative skin reactors showed calcified peribronchial glands and a hilum type of tuberculosis.

Regarding negative reactors to the regular Mantoux test, we heartily agree with Medlar that "All negative reactors should be carefully watched." This is especially true of nurses in our sanatoria. Geer<sup>6</sup> had 11 nurses, with 2 out of 6 negative reactors, developing tuberculosis. Heimbeck<sup>7</sup> had 69 out of 226 nurses, or 30.5 per cent, coming down with the infection while in training. He also noted that out of 109 cases 51 were negative, 13 of whom later developed active tuberculosis. There were 58 positive reactors, none of whom developed the disease. Here we are dealing with adult nurses in hospital and not with a child's reaction to tuberculin. Boynton<sup>8</sup> reported 18 per cent of negative reactors becoming infected. In Korea, where as yet there is much less immunity against tuberculosis than we see in Europe and the United States of America, and where the mortality rate is exceptionally high, we find that like Paretzky<sup>9</sup> "It behooves us to watch all negative reactors as potentially of low im-

\* Read before the Medical Missionary Association of Korea.

munity, and thus susceptible to disease." In a study of many cases in Korea we find the majority of our normals not reading negative as in America and Canada, but reading a slight positive O.T. (Mantoux reaction) using 1:10,000 or 1:1,000 dilution, suggesting the presence of infection but not necessarily activity of the disease.

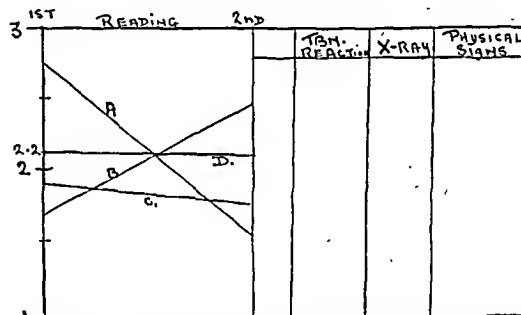
A study was made of an adolescent and adult group of 170 doubtful, minimal, and advanced cases, using the above technique, that is, at 10.00 a.m., after the first blood had been taken and counted (200 cells in all cases were counted by the same technician) a modified Mantoux test was given, and 24 hours later, a second blood count was obtained, and a graph of the two results plotted. All of the inactive cases, except the arrested ones, had an initial reading above 2.2, and all the active cases below 2.2. The results of the tests were as follows: (1) Most of the negative skin reactors to this modified Mantoux gave a low resistance or immunity reading, all being about 1.6 with an active rise, and x-ray and physical findings were positive for tuberculosis. (2) Clinically arrested cases, and those with a history of pleurisy with effusion, without apparent parenchymatous involvement, showed a reading below the 2.2 level, and a moderately inactive drop, almost parallel to the horizontal, suggesting the possibility of relapse. (3) Active cases, especially those with laryngeal or other complications, showed a low first count like the negative reactors, and a sharp rise above the horizontal, the rise being in proportion to the amount of activity shown by x-ray and physical findings. (4) An important fact was noted in cases of pneumothorax collapse controlled by sedimentation rate readings.

At first, the L.A.R. and S.R. curves rose together, and then dropped as the collapse was completed and physical signs improved. The L.A.R. with Mantoux tests were given weekly, and in cases in which pneumothorax had to be abandoned because of adhesions or fluid, the L.A.R. showed an active rise again, showing that the test is of value in demonstrating activity or inactivity at the time of the test.

(5) The test was also of value in advising pregnant women with histories of pleurisy or arrested tuberculous lesions as to whether they should go on to full term. A test was made monthly, and from the first three months of pregnancy, and readings noted. (6) The test is also useful in cases of differential diagnosis, especially where there is doubt between early hæmoptysic heart cases, and other chest conditions, such as the hæmoptysis of lung distoma, of which we have a great number of cases in Korea. (7) One case, of a woman of thirty, picked as a normal with symptoms only of neurasthenia and no clinical signs of tuberculosis, after testing showed marked activity; a week later her sedimentation rate was 49, and two weeks later, the first x-ray signs were seen in the parenchyma of the lung. (8) In the 200 cases studied, the results of the test agree entirely with the physical, x-ray and laboratory examinations. These were

A. Inactive cases .....	46
B. Active cases .....	122
C. Arrested cases .....	32
Total .....	200

#### L. A. R.



Graphs of typical readings taken from the 200 cases studied. A.—Inactive drop. B.—Active rise. C.—Arrested cases. D.—Normal ratio.

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## Case Reports

### ALLERGIC REACTION TO STILBESTROL

By K. A. BAIRD

*Saint John, N.B.*

The following case is reported as evidence that some patients may be allergic to synthetic oestrogenic preparations.

Mrs. J.L., aged 48, visited her doctor complaining of menopausal symptoms, (hot flashes, dizzy spells, etc.). She was given a prescription for stilbestrol tablets. Her symptoms were definitely relieved in a very few days, but four days after beginning to take the tablets, she developed a rash over the arms, legs, and some parts of the body. This was itchy and irritating and when admitted to hospital next day, some areas were "weeping" and infected.

The tablets were discontinued, calamine lotion was applied to the rash, and moist boracic dressings to the area for three days. When some menopausal symptoms returned they were relieved by an intramuscular injection of one of the ordinary commercial preparations of naturally-occurring oestrogen in oil. She was discharged ten days after admission with her skin condition practically cured.

### A CASE OF PRIMARY AMENORRHOEA

By R. V. CHAPPLE, B.A., M.D.

*Sudbury*

Miss L., aged 16, came to us accompanied by her mother first on November 7, 1938. The mother stated that as yet her daughter had not menstruated while secondary sex characteristics had appeared two years previously.

*Previous history.*—The patient had a normal birth with no history of cerebral injury. Growth during childhood was equal to that of her brothers and sisters. Her academic record had been exceptionally good. She had always been cheerful, with no depressive states. Childhood diseases consisted of measles, scarlatina, and occasional colds.

*Family history.*—Irrelevant.

*Physical examination.*—Height 5 feet 1 inch; weight 93 pounds.

Physical examination revealed no abnormalities. The thyroid was just palpable. Breasts were very small, though rounded. Pubic and axillary hair was present. The vulva appeared very infantile. Rectal examination was performed but results were very unsatisfactory, due to apprehension of the patient. Urine negative.

On November 11, 1938, under gas anaesthesia the vaginal tract was explored. The external genitalia were all present and normal in structure but rather infantile. The introitus was intact. A small vertical septum was present in the vagina about one inch from the introitus, extending to about two inches from it. This was ruptured by the examining hand. The cervix was very small, about three-quarters of an inch long and one-half inches in diameter. The os was extremely small, admitting a small probe which passed about one and one-half inches. The uterus and ovaries were not palpable bimanually. The adnexa presented no masses. The diagnosis was primary amenorrhoea due to hypoplastic or infantile uterus and ovaries.

With the presence of secondary characteristics as mentioned one assumes that the sex factor in this patient is essentially female. The absence of menstrual flow is possibly due to either (1) absent or hypoplastic ovarian tissue; or (2) an infantile uterus, or a combination of both.

Sifting out the maze of literature on endocrinological topics one is impressed by the diversity of general opinion. However, it was felt in a case like this that some substance must be supplied which will create a follicle stimulation and then a luteinization phase, thereby setting up the normal ovary-uterus cycle. In this we are assuming that there is sufficient ovarian tissue present to stimulate, irrespective of the fact that the ovaries are not palpable. We know there is a small amount of uterine tissue present. A precursor to this treatment would be some oestrogenic substance with a view to stepping up the endocrinological system before specific treatment was given. (The Professional Service Department of Ayerst, McKenna & Harrison, Montreal, was consulted in respect to possible substances available).

It was decided to use emmenin, gonadotropic factor and A.P.L. in an effort to set up the desired cycle. The so-called "priming period" with emmenin began December 9, 1938, and ended January 30, 1939, the dosage being one teaspoonful of the liquid three times daily. Specific treatment followed with the injection of 1 c.c. A.P.L. and 1 c.c. gonadotropic hormone tri-weekly. Injections were made simultaneously, beginning January 30, 1939. This treatment was carried on until August 8, 1939. The first symptom of a menstrual cycle occurred on April 5th, when the patient complained of lower backache, malaise, and a watery discharge. These cleared up completely by April 12th. Examination at this time found the breasts larger than previously, firm, with no tenderness. The vulva was considerably increased in size, cervix soft, without any definite enlargement; the uterus was not palpable.

The second unit of a menstrual cycle occurred from May 16 to May 22, 1939, when the patient had a definite menstrual period. The injection of hormones was continued. The next period or pseudo-period occurred from June 25th to June 29th, followed by a normal period between July 5th and 10th. Treatment was maintained and a further period occurred between August 8th and 12th. It was felt at this time that a proving time should be allowed to see if the patient would continue her cycle. No further injections were given after August 8th.

The patient had no further periods and reported again on November 11, 1939. At this time she stated that she did not want to take further injection if any other method of treatment was available. A synthetic oestrogen, stilbestrol, was considered as a possibility of producing further uterine growth and secondary sex development. Estrobon (Ayerst, McKenna & Harrison) 0.5 mg. capsules, was used in the following manner. Three tablets daily for three months, then

a free interval of one week. This routine was to be repeated for three months. However a menstrual period occurred from January 5th to 11th. Treatment was stopped during this period and continued at its cessation until January 31st when a further period occurred. Examination at this time revealed the breasts much larger, firm, well rounded. The cervix appeared larger and somewhat soft. The uterus and adnexa were not palpable. The patient appears much brighter and more interested in life. The patient has not had further treatment, *i.e.*, since January 31, 1940, and to date is having regular normal periods.

#### COMMENT

1. A case of primary amenorrhoea is presented with a satisfactory outcome.

2. The fact that the patient had no periods when treatment was stopped and then began

again after treatment was re-instated strongly suggests the value of this treatment.

3. The increased size of the genitalia, and breasts, together with the changed outlook of this patient, is further evidence of the value of the treatment.

4. The full co-operation of the patient must be elicited, as injections tri-weekly over a period of months is something one should not think lightly of.

We wish to thank the Professional Service Department of Ayerst, McKenna & Harrison for their valuable literature and advice; also for the hormones emmenin, A.P.L., and gonadotropic substance which they supplied for our use gratis.

## Editorial

### LINES OF DEFENCE . . . AND OF OFFENCE

AT this present, even more than in the so-called Great War, the resources of our Empire are being mobilized to the limit. Not only are soldiers, sailors, aviators, professionals, and amateurs called upon for service, but the whole population, men, women and children, finds itself confronted with tasks of vital importance. This War is everybody's war. The response from all classes of our people has been spontaneous, quick, and whole-hearted. This is, of course, highly gratifying, but it is not enough. We must see to it that each of us is assigned to the duties that he is best qualified to perform. Those who do not come up to standard must be trained if that be possible or transferred to a more suitable job. A basal requirement is that the health of all be promoted to the limit. If it is not, we are doing less than our best.

We not infrequently speak of our combatant forces as "the first line of defence". It is doubtful if we are justified in so doing. Indeed, as His Majesty has said:—"We are all in the front line." While our fighters are of inestimable value it is obvious that they would be less effective, indeed, they would be betrayed, were they not supplied with reliable guns and ammunition, ships, planes, tanks, food, and a sufficient reservoir from which to draw their supplies and reinforcements. As important, therefore, is our army of industrial workers. Then come the rest of us, with varied, perhaps lesser, talents and different opportunities. Should

we speak, then, of a second or a third line of defence? We think not. The "lines of defence" are numerous; they merge and converge, looking towards the final goal—victory. Some of them, too, if important in wartime, are as important in peacetime if we are to build up a healthy, strong, brave, and resourceful people.

In all of these spheres the rôle of the doctor bulks large. He is by no means the least factor in the coordination of the common effort; his duties carry him far and wide. All this sounds commonplace; we assent to it at once. Do we properly apply the knowledge we undoubtedly possess? Do we fully grasp all the implications? In some particulars we might do better. No doubt the will is there, but the performance is sometimes weak.

Major-General LaFlèche calls attention to one situation that calls for remedy. He finds that many recruits are categorized in certain classes at their first medical examination, but when they come to their second examination, this time at the hands of other medical men who belong to the Army Medical Corps, they do not stand up so well. Probably this is due in the first instance to lack of experience and inattention to detail, but now that every medical practitioner in Canada is a potential Medical Examiner for military service the matter assumes even greater importance.

The practice of x-raying the chests of prospective recruits is an excellently good

one. It will block the enlistment of many undesirable men, will prevent much illness on active service, and will save the country millions in the cost of treatment and subsequent pension, particularly in the case of tuberculosis. Dr. Andrus, also, in a valuable article in this issue, calls attention to the importance of "deep chest" in evaluating the "enlistability" of prospective recruits. We would suggest that testing for syphilis is of as great importance.

Aviation Medicine has by now attained almost the dignity of a specialty. Not only does the examination of the applicant in the first instance demand wide knowledge and experience on the part of the medical examiner, but high speeds and high altitudes have confronted us with new problems which urgently demand investigation. The *Journal* hopes to devote more attention to this subject in the near future.

Then, we come to our operatives, of whom the classes are endless. Their selection for fitness and their maintenance in vigour is of fundamental importance. Work rooms and factories should be roomy, well lighted, and well ventilated. The health of our manual workers should be promoted by medical examination before they enter on their special tasks and by periodic tests in the case of those who are engaged in hazardous occupations, such, for example, as the manufacture and handling of explosives. Inefficiency due to fatigue, ill health, means diminished output, mistakes in delicate operations, accidents, and diminution in "pep".

In Great Britain the Health of Munition Workers Committee, years ago (1915), found that a seven-day working week had bad effects. The statistical evidence collected for the Committee showed that men engaged in fairly heavy work attained their best production on a fifty-five-hour week.

"A medical examination of 1,540 men (aged 41 or more) drawn from a number of munition factories showed that 17 per cent were 'slightly below normal', while 5 per cent were 'much below normal' and 0.4 per cent were in 'bad' condition. The 1,500 boys examined (at ages of 14 to 17) were healthier than the men, in spite of the fact that most of them were working for sixty to seventy hours a week. This was probably because of the shorter periods for which they had been engaged on munition work and the lighter character of their occupations."

The diminished output due to strikes, lockouts, and "sit-downs", mentioned in other countries, does not worry us of "The Empire", thank God. Our operatives have met the emergency nobly, and, too, are in "the front line."

All of which is well known to us, accepted in principle, but not yet fully put into practice. It is mentioned once again, "lest we forget." We are glad to add, however, that our Association is concerning itself with Industrial Medicine under war demands, and a draft syllabus has already been drawn up.

A.G.N.

I. VERNON, H. M.: *Brit. M. J.*, 1940, 2: 25.

## Editorial Comment

### Rats in the West

Plague surveys in Western Canada are reported in a recent issue of the *Canadian Public Health Journal* by Gibbons and Humphreys.\* They say, "Sylvatic plague was first demonstrated on the North American continent in 1909 infecting ground squirrels in the state of California. Subsequent extensive field investigations have discovered wild rodent plague in ten of the western states, including Washington, Idaho and Montana, which border on the provinces of Alberta and British Columbia. Twenty-

nine species of rodents have been incriminated, of which fourteen species of ground squirrels form the most important reservoir of infection.

"Following a general survey in 1938, particular attention was given to the southern portion of each province in view of the known sylvatic plague foci in the border states.

"No evidence of plague was found in 3,949 rodents and 10,066 fleas collected in British Columbia, nor has any history been obtained of suggestive rodent epizootics.

"In August, 1939, *Pasteurella pestis* was demonstrated in tissue from a Richardson's ground squirrel found dead in eastern Alberta, 180 miles north of the international boundary. Five out of 80 flea pools and one out of 60

\* Gibbons, R. J. and Humphreys, F. A.: Plague surveys in Western Canada, *Canad. Pub. Health J.*, 1941, 32: 24.

tissue samples have been positive for plague. These new findings place the infection over an area of at least 144 square miles extending into four townships.

"Before the discovery of sylvatic plague in this area a local farmer had died under conditions which in retrospect are suspicious of plague infection.

"Though no definitely proved cases of human plague have occurred, the demonstration of infection in wild rodents is a matter of concern because of the potential hazards involved. A single unrecognized human case, should it become pneumonic, could readily initiate a sharp and highly fatal epidemic. This was illustrated in the Oakland outbreak of 1919 and the Los Angeles epidemic in 1925. Further, should infected ground squirrels come in contact with rats in an urban area, the disease might, if conditions were suitable, become epidemic in the classical form.

"At present we do not know how the infection in wild rodents was introduced into Western Canada or to what extent it has or will in the future spread. Since wild rodent plague may remain apparently quiescent in any one area for

several years and then reappear, negative findings in any one season do not preclude the presence of plague infection. Extensive and continued examinations of the wild rodent population are therefore necessary if the infection is to be controlled."

The brown (or Norwegian) rat was first reported in Saskatchewan in 1912, when rats were observed in the village of Gainsborough just west of the Manitoba boundary in the extreme south-east corner of the province. Rats have for many years been prevalent in Manitoba and the more eastern provinces and the migration is undoubtedly in a westerly direction.

Rats are travelling west over the prairies at the rate of about 30 miles a year. At present they are about half way between Moose Jaw and Swift Current. When they meet the plague-infected squirrels in Alberta the situation may be serious.

Dr. George Walton, medical health officer of Regina, says, "Sylvatic plague amongst Saskatchewan wild rodents has not yet been reported, but no surveys have been conducted. The danger is not immediate but it is a possibility and not a remote one".

LILLIAN A. CHASE

## Retrospect

### NON-TUBERCULOUS THORACIC EMPYEMA. COLLECTIVE REVIEW OF LITERATURE FROM 1934 TO 1939\*

ABSTRACTED BY FRANK DORRANCE

#### Montreal

The historical basis dates from the time of Hippocrates, who advised open drainage. The Empyema Commission, about 1920, established a modern concept of this condition and the treatment has been followed more or less generally to the present time. It is appreciated, however, in the case of the individual patient that this statistical study does not give all that can be known or done to ensure a functionally satisfactory lung. Reiteration at present in view of the mild influenza epidemic and the collection of large numbers of men in camps is deemed advisable. Few surgeons have the opportunity to treat more than a few cases during each winter season. The non-tuberculous is as much an entity as the tuberculous type, particularly in regard to treatment.

In Washington, with a population of one-half million, 317 cases were treated in their hospitals in 5 years; in Gothenburg Children's Hospital there were 159 cases in 15,302 admissions. Empyema is practically always secondary to pneumonia or influenza, the percentage varying

from 80 to 60 following pneumonia, although the inverse ratio might occur as in the 1918 influenza epidemic. Following pneumonia in children empyema occurs in 6 to 12 per cent. Other causative organisms have been found, namely, streptococcus, staphylococcus, combinations of the above-mentioned, actinomycosis, fundiliform b., *B. typhosus*, *B. coli*, *B. megatherium*, *Br. abortus*, and *Ascaris lumbricoides*. The finding of the infecting agent is essential to a proper treatment; negative smears or cultures are strongly suggestive of tuberculosis or cancer.

Synpneumonic empyema is usually streptococci and requires different treatment from the pneumococcus type which follows upon pneumonia. In this regard "unresolved pneumonia" is more often empyema. The diagnosis is suggested by a septic type of temperature; the physical signs are not pathognomonic. X-rays taken in frontal, lateral and frequently oblique planes and the use of the aspirating needle are the most informative procedures. Repeated x-rays are of distinct value in watching the progress of interlobar collections of pus; these should not be allowed to rupture into a bronchus. Exact definition of the limits of fluid by x-rays should be made before operative intervention. In encysted empyema the roentgenograms will definitely localize the site, size, and shape of the fluid.

Aspiration is the only definite means of diagnosis when pus is found. It enables us to dis-

\* Ehler, A. A.: *Surg., Gyn. & Obst.*, 1941, 72: (Inter. abstract, p. 17).



tinguish between a thick pleura, pulmonary infiltration or fibrosis, solid tumours, and atelectasis and is of distinct value in children with lobar or lobular pneumonia in whom there is frequently fluid in the pleural cavity. In rare cases the pus withdrawn may come from infected pulmonary cysts or tumours, or may be obtained by the incidental transpleural aspiration of a subphrenic abscess. A small amount of fluid is often present in the costo-diaphragmatic sulcus in pneumonia. This is particularly true in children in whom the fluid progresses from being yellow or slightly cloudy, containing a number of endothelial cells, to cloudy with endothelial cells and leucocytes, usually lymphocytes, to cloudy containing polymorphonuclear cells, and thence to cloudy with polymorphonuclear cells and pathogenic micro-organisms, or it may be arrested prior to the final state. Olesen and Hansen have used a supravital staining method to distinguish whether the leucocytes are living or dead, in which latter instance pus is usually found at a later date. Aspiration has been used by Harrington immediately prior to operation to outline the tract so as to ensure proper drainage. This method is not without danger to the patient.

The pus should be examined and the infecting organism isolated and recognized before operation. Alexander and Kinsella insist on immediate smear, culture, and injection into the guinea-pig in order to rule out tuberculous infection with superimposed pus-producing infection.

The physical characteristics of the pus are of distinct value in determining the time for operation. White insists that not more than 10 per cent of supernatant fluid be present after the pus has stood for 12 hours; Fitzgerald would have a positive manometric pressure in the pus; Pearce would wait until the specific gravity becomes constant, which is usually about 21 days after infection; Susman wishes a fixed intrapleural pressure and believes it indicates a localization of pus and fixation of the mediastinal structures; Berman uses the fluoroscope to show little or no change in the width of the mediastinal shadow with the two phases of respiration, and thinks this occurs at 7 to 10 days, at which time the pus is still thin; Graham would await thick, creamy pus, whilst Mason thinks that approximately 18 days in children is the proper time to intervene. All wish localization of pus, fixation of the mediastinum, and seek to avoid an open pneumothorax in the early stages of the disease.

Toxemia and exhaustion are largely responsible for the mortality with empyema. Perforation of the chest wall, into a bronchus, the trachea, the oesophagus, the pericardium, the mediastinum, through the diaphragm (intra- or extra-peritoneally), to the perinephric space, into a blood vessel or into the spinal canal may occur. Spontaneous resorption of empyema occurs rarely, if ever. Healing of the cavity occurs as a result of the progressive formation

of fibrous adhesions between the visceral and parietal pleura. Whether this be by centripetal progression or not has not been settled.

The criteria upon which any method of treatment must be judged are, primarily, that such treatment will save the life of the individual. Other, but still important, results to be obtained are complete evacuation of the pus, rapid elimination of toxicity and systemic effects, sterilization and subsequent complete closure of the cavity, complete healing of the external wound, restoration of the normal respiratory function of the lung, restoration of the patient to his normal economic and social status, the avoidance of chronic empyema and recurrence, and, finally, but not least, all these results in as short a time as possible.

Many methods of treatment are available, which roughly may be grouped into four classes: (1) drugs of various sorts; (2) aspiration of the pus with or without the introduction into the cavity of air or chemical solutions; (3) closed drainage, in which an effort is made to prevent the ingress of air; (4) open drainage in which negative intrathoracic pressure is not so thoroughly guarded against.

There are a few favourable reports on the treatment of streptococcal empyema with protosil or sulfanilamide derivatives both by mouth and as an injection into the cavity, but they are of small series. On the whole the results are not to be considered as offering a solution as specific treatment for even streptococcal empyema, inasmuch as it does not ensure even a reasonable removal of the pathological state.

Aspiration is a valuable diagnostic and therapeutic procedure up to a certain point. Its proper evaluation as a therapeutic measure should be judged by mortality, duration of toxicity, the number of failures, and the duration of convalescence. When so judged it falls much below other accepted methods. The injection of air following aspiration has several distinctly unfavourable effects, such as increase of respiratory embarrassment, probably an increased absorption of toxins, retardation of the formation of adhesions, and masking of the development of broncho-pleural fistula. The injection of optochin or iodized oil has had some favourable results; the latter has gained prominence as a means of outlining the extent of cavities pre-operatively.

Closed drainage does not allow for the operative removal of fibrinous masses, the recognition of bronchopleural fistula, the recognition and exploration of accessory pockets of pus, or assurance of dependent drainage. It greatly depends for its efficiency upon the suction and chemical solutions used in any of the many types of this procedure. A comparison of end-results from Wallace's, White and Collins, Utter, Mihara, Burpee, and Hochberg in a fairly large series of cases in each instance all show a much lower mortality by rib-resection than



by closed drainage. There is not much difference in post-operative hospitalization between the two methods. A score of reports in the literature, when grouped, show a mortality rate of about 15 per cent in any large series, although some have as low as 6.5 per cent under open drainage. The inference is that low mortality is considerably dependent upon local conditions.

The open drainage method is well standardized as to technique. Two new operations, Connors' and Weinberg's, are dependent upon the pre-operative formation of pleural adhesions. Weinberg's is roughly the formation of a moderate-sized pleural opening with tampon made with rubber tissue packed with gauze, which allows egress of pus but no ingress of air—53 patients with no deaths. Connors' is much the same technique but packing with gauze rather than "curtain drainage".

Koster insists that prolonged morbidity is due to lack of lung re-expansion. The use of "blow bottles" is deprecated; McMahon's inspiratory exercises seem to find more favour. Suction constantly performed is of distinct help, whilst the Drinker respirator has had good results in several old cases.

Infections of the chest wall are due to too strenuous efforts to prevent ingress of air about the tube, particularly in peritubal suturing. These may be prevented by the use of packing around the tube with vaselized gauze, or passing the tube through a sponge which closely hugs the chest wall.

Scoliosis of the non-rotatory type is usually present in most of the empyemas. It is best overcome by early and thorough removal of the pus. The prevention of chronic empyemas is

best overcome by leaving the tube in long enough, by having dependent drainage, the right length of tube (the inner end just within the parietal pleura), the removal of all fibrin at operation, and the prevention of the entrance of foreign bodies either from the rib or equipment used during drainage. Roberts has had the best results in chronic empyema. He uses a preliminary period of proper drainage, resection of ribs in several stages, with closure of the drainage opening for several days following each resection; the parietal pleura and overlying muscles are hinged posteriorly with the excision of extraparietal fibrous tissue posteriorly, and gauze impregnated with flavine and paraffin placed in contact with the flap. Later this is removed and drainage is used in such locations as where adhesions have not formed with external pressure dressing—100 cases with one death. Muscle-flap transplants with thoracoplasty have been generally used.

Putrid empyema has been classified as a clinical entity by Neuhof with tissue necrosis as a predominant feature. It may arise as putrefaction after pulmonary hæmorrhage, necrosis of lung after infarction or trauma, and pleural invasion from anaerobic subphrenic abscess. The onset and course resemble pneumonia, but the pain is local and constant. Foul sputum or odour is diagnostic. Its treatment is immediate evacuation of the pus, adequate aeration with wide "unroofing", and packing with iodoform gauze. Note.—Zinc peroxide as recommended by Meleney might well be used. Infection with spirochaetosis and fusospirochaetal organisms may be treated in the same manner.

NOTE.—The bibliography includes 196 references.

## Men and Books

### MEDICINE DURING THE RENAISSANCE

(WANDERINGS IN UNIVERSITY CITIES)

By EUGÈNE St JACQUES

*Professor in the University of Montreal,  
Montreal*

First of all, what do we call the Renaissance? By common consent, and, as clearly stated by Symonds and Bensusan, 'it is "that brilliant period of development in aesthetics, art, scholarship, and social and political life which covered the XVth and XVIth centuries." It means in the religious world that striving for liberty of thought and expression which led to unhappy excesses in all quarters. If on the one side we have the Inquisition, on the other we meet with the outburst of intolerance of Luther against those who opposed him, as also the intolerance of the Master of Geneva, Calvin, against the liberty of expression that he claimed for himself,

as shown by his burning at the stake of Michel Servetus with all his works because of propositions with which he did not agree.

In the social domain we witness the organization of the common people against the plundering barons, as well as the dawning of a new outlook on life brought about by the inclination towards antiquity.

In the field of letters we find a ferment for a broader outlook springing up everywhere and general knowledge spreading out of the monasteries. Paper was substituted for parchment, which was more expensive, and printing, discovered by Gutenberg in the XVth century, promoted the dissemination of knowledge. Dante created the Italian language. Boccaccio established an admirable prose. Petrarch, whose admiration for antiquity was deep, favoured the spreading of its knowledge and taste. Pico della Mirandola and Erasmus, great humanists that they were, exerted themselves for the free spreading of science and general knowledge.

Was the Renaissance a spontaneous movement? Far from it. In the field of letters, as in others, spontaneous generation is an illusion of the past, not accepted nowadays. True, the VIth, VIIth, and VIIIth centuries had been in Europe a "long winter", as Symonds calls it. If that epoch has been named the Dark Ages it is because the old Greco-Roman civilization had been extinguished by the barbarian Huns, Goths and Vandals, who had emerged from their forests over the Rhine and swept down through Gaul to Italy and Spain, devastating everything under the sun. Knowledge had taken refuge in the monasteries and all through the following centuries the monks were the only people with any culture.

All through this period great minds had been at work, nevertheless. Benedict, the founder of the Benedictine Order in the VIth century, Albertus Magnus, the monk Thomas Aquinas, Roger Bacon, Alcuin, had contributed much to the general knowledge. Bacon had claimed freedom for the scientific mind. For centuries, as Symonds remarks, the Church was the sole repository of learning and culture.

But the major inciters towards a new mode of living and thinking were two great figures, though quite the opposite of one another. They were Francis of Assisi and Petrarch.

Francis of Assisi, in absolute contrast with the stern outlook on life which was still fostered by the Church, proposed to the world to alter its general appreciation on life—to make of religion a sweet thing—to foster charity and good-will towards all. Consequently he stands "pre-eminent as the emotional well-spring and the inspiration of a new pictorial art", says Symonds. "Joy of life in him brimmed irrepressible and spontaneous as from a full cup" (Symonds). As for Petrarch, the humanist, he was indeed a pioneer in the XIVth century in bringing forth the beauties of the ancient civilizations of Greece and Rome, and was thus a nearer promoter of the Renaissance.

Next to Petrarch was the great Byzantine Chrysolaras who came to lecture in Florence under the Medici at the end of the XIVth century. Later, with the fall of Constantinople in the middle of the XVth century (1453) the Greek scholars who already knew the road to Italy flocked in greater numbers to this sunny land, to its universities and academies.

Bologna University had been founded in 1158. Padua had followed in 1222, Sienna in 1248, Perugia in 1266. Salamanca founded in 1246 had attained quite a world-wide reputation. Oxford, born in 1249, had a century later some 14,000 students on its roll call. Nor must one forget the contributions of the Arabs through their translations of the Greco-Roman scholars as well as their own from the universities of Bagdad and Cordova.

Public libraries were few in those days, and nearly all of them were in the monasteries.

Cosimo di Medici seems to have been the first promoter of public libraries. Tommaso Parentinelli, protected and encouraged by Pope Nicholas VI, was set to translating the classics into Latin. Then printing gained a vogue, and the great Venetian Aldo Manuzio helped wonderfully the spread of knowledge by the establishment of his printing press.

And so step by step, stone by stone, many bringing each his contribution, knowledge spread and gradually fostered the awakening of the general mind which finally blossomed into the Renaissance.

What part did medicine play during the Renaissance? It was a major one and followed the general trend of progress.

The first figure we meet is Thomas Linacre (1460-1524). He was a man of extensive learning, having first studied at Oxford, then at Bologna and Padua, which were then at the head of the blossoming universities. He was both a great physician and humanist and well versed in the natural sciences for the time.

On his return from Italy he settled in Oxford where he translated into Latin the works of Galen. Having been appointed physician at the Court of Henry VII and later Henry VIII such high position invested him with great authority. He was the founder of the Royal College of Physicians. He taught Greek at Oxford and had as pupils Erasmus and More. In fact he is regarded as the "restorer of learning in England".

Oxford is a most captivating city, "a forest of laced spires", an architectural gem. It offers "unexpected contrasts and charming inconsistencies", for Oxford is "a city of the Middle Ages whose spirit speaks also of tomorrow", as said John Long. Situated along two rivers, the Isis and the Cherwell, amongst meadows of the purest green studded by elms and oaks centuries old, this city is indeed a charming one.

Learning at Oxford is old. Its colleges are centuries old. Was not St. Edmund Hall founded in 1226 and Queen's College in 1390?

What a captivating sight when canoeing on the Cherwell and passing by the Botanical Gardens, Magdalen Tower dominating the ancient bridge comes in the landscape! It is from the top of this tower that a hymn to the rising sun is sung on May 1st.

A walk through High Street brings one in view of St. Mary the Virgin's steeple with its fine porch, and facing it stands University College, one of the oldest of the twenty-one colleges of the city. And if we keep up our wanderings we come to Christ Church College with its thrilling Gothic dining hall, its impressive grand staircase and its marvelous chapel, a gem of Gothic architecture. A turn to the right or the left brings one to the reposeful walk of Merton College with its Tintoretto altar-piece and its chained incunabula in the old library; evidently in those days students were not to be

entirely trusted! Further on we come to New College and its glorious painted window after Reynolds, and the flowered gardens of Wadham nearing those of Worcester College with its enchanting lake adorned with graceful swans. Our hasty walk around the city would take us also towards venerable Balliol, founded in 1268 by the mother of John Balliol, king of Scotland, and its nearby monument to the three martyrs: Thomas Cranmer, Nicholas Riley, Hugh Latimer—testifying to the cruelties of an intolerant religious epoch. Next to it stands the Sheldonian Theatre, home of the severe but always courteous officials, and the venerable All Souls College with its towering dome.

Finally our steps would carry us to the Bodleian Library "the granddad of all English libraries in the world", as Lang calls it, the sanctum sanctorum of Oxford wherein the legacy of by-gone great minds is religiously guarded.

The Bodleian Library is one of six English libraries that enjoys the right to a copy of every book published in the United Kingdom. In size its collections are only surpassed by those of the British Museum and the Bibliothèque Nationale in Paris.

But the sun is setting and Great Tom from the tower of Christ Church announces the closing of the college gates by its ringing 101 strokes—as many as the number of original students of the college plus one.

Oxford is indeed a glorious city with a background of centuries-old learning and traditions which have moulded the leaders of England.

Of course Oxford in Linaere's time was not what it is today. Teaching had already been going on for a couple of centuries, and the trend to sport was not what it has become latterly. But the general atmosphere of learning was there and its teachers' renown already stood high.

Two of the most interesting books about Oxford I have read are "Barbara goes to Oxford" by Barbara Burke, and "Lady Connie" by Mrs. Beecher Ward. The second book goes more deeply into the social and university activities: they both brought back many pleasant recollections.

May we mention here a great friend of Linaere's, Leoniceus (1428-1528). He had transcribed in Latin the Aphorisms of Hippocrates and taught medicine in Padua and Bologna. He even corrected some of the errors of Pliny's Natural History!

Of course Cambridge claims an equal part in the fashioning of the leaders. Like Oxford it is steeped in tradition and equally famous as a centre of learning. Both are charming cities for those who prize the value of learning and love quietness and solitude for study.

What more pleasant sight than the backs of King's College in Cambridge, with its glorious chapel. Canoeing and punting are very pleasant

on the Cam and one of the nicest nooks on the river is a spot back of King's College facing the meadow of St. John's College. Happy is he whose soul understands the beauty and the enthralling features of such cities as Oxford and Cambridge, which stand unique in their realm!

Let us now cross the Channel in order to point to a great renovator in the field of letters as well as an original propounder of medical thought—Rabelais (1490-1553). Rabelais, who was invested with Holy Orders for a while became a rover. Born at Chinon in the most agreeable of countries, La Touraine, he wandered right and left, gathering observations and data for his strange and immortal Gargantua and Pantagruel. He was amongst the first to translate into Latin the Aphorisms of Hippocrates, of whom he was always a follower, and when, finally, he lectured at Montpellier he commented directly from the Greek text before him, as he was a great humanist—all of which would have gladdened the heart of Linaere.

Montpellier is a quaint ancient city of southern France which has kept many of its old characteristics. The medical faculty adjoins the old cathedral; the old Hôpital St Eloi still stands as well as l'Hôpital Général. Medical teaching is of very old standing in this city; it goes back as far as the Xth century when Arabs and Jews coming from Spain, and Christians, as well, from Salernum began to dispense medical knowledge privately. *Experientia Magistrorum optima*, as says the old parchment. Then in 1220 the medical school was regularly organized by Pope Honorius III. It was from 1530 to 1537 that Rabelais came to Montpellier and taught after Hippocrates, in antagonism to the teachings of Avicenna, chief physician to the Bagdad Hospital, which held sway in those early days.

Paracelsus (1493-1541) was one of the dominant medical figures of the Renaissance. The son of a physician, he directed his studies towards chemistry, physics, and the natural sciences. He opposed the Galenic teachings, reverting to the Hippocratean idea, that observation of the sick was the basis of medicine leading to a good diagnosis and therefrom to a practical therapeutic. He taught in the popular vernacular, and seems to have been at loggerheads with every one, which led him into troublesome adventures.

Born at Einsiedeln, a monastery town near Zurich, he later got his medical degree under Leoniceus in Ferrara, and then wandered all over Europe. He settled in Germany where he attracted a great clientèle. Unhappily, he was truculent and vulgar. His bombastic affirmations aroused antagonism everywhere, for he loudly condemned his predecessors and raised his voice against the dogmatism of the schools. He insisted on the predominance of his personal judgment and was a bit of a charlatan. His knowledge of chemistry led him to propose a therapeutic by chemicals, and he also showed

the virtues of many natural springs as those of Baden, Ems and Ragatz, the quaint little city by the Taormina gorge in the Grison district. Everywhere he went he got into trouble and finally had to leave Basle where he was teaching.

Leonardo da Vinci (1452-1519). And now let us call attention to one of the greatest renovators and minds of the Renaissance.

Leonardo da Vinci is of course looked upon as a master in painting, but he was also of a widely scientific mind. Was he not the first to speak of the aeroplane and make designs for it? He was at the same time a great painter, a sculptor, a mathematician, a military engineer and an architect in all of which he seems to have excelled.

What was his contribution to medicine?—an important one indeed. He dissected and designed most faultlessly the muscular system of the human body, and the plates he produced equal those brought out later by Vesalius. His training began under Verrocchio the sculptor. Though he lived mostly in Florence, he was called all over Italy—to Rome, to Bologna, to Milan, where he painted the famous Last Supper in the Convent of Sta Maria delle Grazie, and served Ludovico as military engineer and architect for his crenellated palace.

Invited finally to France by Francis the 1st he moved to Amboise where he died. All those who have visited the Chateau d'Amboise will remember the beautiful little chapel with its stained windows and attractive facade of St Hubert, where the great scientist is buried, one of the most pleasant spots of the whole of the Touraine region.

Michel Servetus (1509-1553). Born in Spain, Servetus was also one of the leading anatomists of the Renaissance and opened the way to the great discovery of Harvey. After having been a fellow student with Vesalius in Paris under Sylvius—he came to teach in Padua. He entertained liberal ideas for the time and was inclined towards astrology. He was also a pioneer in physiology, for he demonstrated the pulmonary circulation. Up to his time the consensus on the circulation of the blood was rather hazy. The School of Eristratus of Alexandria held that the air was drawn from the lungs into the left ventricle and pumped from it through the arteries to the tissues. The Galenists opposed such a theory and claimed rather that the veins originated in the liver which supplied the blood with nutrient—whilst the arteries originated in the heart which supplied the blood with a hypothetical spirit, just as essential, as nutrient. Of course the physiological part played by the blood and the lung was obscure; it was only gradually that enlightenment came about.

Amongst the anatomists of this period we must single out Sylvius or Dubois, of Paris, who taught Vesalius. But unhappily he turned against his former pupil when Vesalius published his new treatise on anatomy, which con-

founded his teachings. Up to the coming of Vesalius anatomy was taught according to the findings of Galen, which means many errors. Dissection of the human cadaver was not held in honour and only seldom done. Frederic the II of Naples, indeed, had authorized human dissection in Salernum, but only once every five years.

Much later Mundinus (about 1275-1290) at Bologna gave the first public demonstration at the beginning of the XIVth century. He followed on the footsteps of Galen and the Arabian masters. Errors were many and they were repeated in the 33 editions of his work which remained the textbook for over a century.

Bologna, which has as its motto *Bologna docet*, had been teaching since the beginning of the XIIIth century. The university buildings of ancient days are as interesting as the old city itself. The streets are bordered by colonades similar to those of the Rue de Rivoli in Paris, offering shelter against rain or sun rays.

The entrance court to the university is imposing. The aula with its old colonnade is impressive, as is also the library rich in ancient manuscripts and incunabula.

Galileo taught in Bologna as also a few women renowned for their scientific achievements, amongst others Laura Bassi who lectured in philosophy. Legend narrates that a woman teacher in anatomy was so good looking that she had to veil her face so as not to provide too many distractions to the students.

The old anatomical theatre in which Mundinus lectured is still there: all the walls are cedar lined and sculptured. On each of the four walls are niches with statues of great medical men: Hippocrates, Galen, Celsus, Mundinus. The amphitheatre stands above a quaint little chapel and history goes to say that during the dissection of the cadaver above, mass was said in the chapel for the repose of the soul of the poor devil.

If Bologna is old as far as teaching goes it is nevertheless quite modern also for all its present university buildings and laboratories are new and its professorial staff is quite modern. It has the double advantage of clinging to its honourable traditions as well as going quite modern.

Bologna still ranks as one of Italy's leading universities with its three main faculties of philosophy, law and medicine and Putti's clinic nearby on the heights.

And now we come to one of the most commanding figures of the time—Vesalius (1514-1564). Of Flemish and medical ancestry Vesalius went first at the age of 14 to Montpellier for his early medical studies. Then he tackled anatomy under Sylvius (Dubois) in Paris. But dissatisfied with the teachings of this Galenist, he went to Padua where he served for five years as prosecutor in anatomy. At twenty-three years of age he was teaching

anatomy at Padua. His newer descriptions of anatomy were published in 1538 but it was not until 1543 that he produced his masterpiece, *De Fabrica Humani Corporis*, in which he proved the fallacies of Galen. His work fell as a bombshell amidst the medical men who up to the time had followed Galen and relied on pure dogmatic teaching. He was violently opposed by his former teacher Sylvius as well as by his distinguished pupil Eustachius. Dogmatism reigned supreme in those days, and innovators met with stern admonition and resistance.

In fact it seems to have been so through all ages. Was it not so with Servetus whom Calvin burned at the stake? with Galileo who was forced to recant? with Copernicus whose work Melancthon regarded as godless? with Harvey who met with great opposition, led by Riolan the anatomist of Paris? And what about Lister and Pasteur, nearer to our day? what a long fight before their findings were accepted and their suggestions spread!

Facing great opposition, Vesalius got disgusted and went over to Spain, being honoured by the appointment as the king's physician to Emperor Charles the Vth. But opposition of the bigoted did not relax. Finally, finding the learned bodies against him still, Vesalius left on a pilgrimage to the Holy Land in atonement for his supposed sins, and, unfortunately, solitary and unbefriended, he died on his return journey on the eve of coming back to his old anatomical chair in Padua to which he had been invited to return on the death of Fallopius.

Padua, like Bologna, is an old university town of Italy which has seen past glorious days. The arcade streets, as found in so many of the southern cities, lead us to the University with its elaborate iron gate dedicated to the last war dead. The inside columned court is majestic. All the walls of the ascending stairs and of the aula are covered with the escutcheons of former pupils.

Above the rostrum of the aula stands the gonfalone of the faculty with a standing picture of King Victor Emmanuel. The rows of elaborated and gilded arm-chairs are there for the guests. Every thing looks very solemn, as befits an "aieule".

Our walk through the sleepy streets takes us necessarily to the public square on which stands the equestrian statue of the masterful condottiere Gattamelata by Donatello, and next to it the Basilica of San Antonio, the patron saint of the city. This grand temple is surely worth a visit by any one in the least interested in the art movement of the time and by those religiously inclined. Italy was then fired by the spirit of the Renaissance and works of art of all description sprang up every where, the genius of its children producing with profusion masterpieces in architecture, sculpture, and painting as well

as jewellery still unsurpassed and seldom equalled.

Let us single out again Eustachius (1524-1579), a pupil of Vesalius who turned against his master though he himself discovered many new things, as the Eustachian canal, the thoracic duct, the suprarenals and the origin of the optic nerves.

Fallopius (1523-1569), another pupil of Vesalius and the discoverer of the Fallopiian tube. To his credit it may be said that he stood fast by his teacher and has left an honourable name.

Let us not forget, either, Fabricius ab Aquapendente (1537-1617) who taught anatomy at Verona and is best remembered by the fact that he rendered possible William Harvey and his epoch-making discovery.

And last, but not least, let us close this series with the brilliant figure of Ambroise Paré (1510-1592). Born in France at Laval on the Mayenne, country of good cheese and wine as well as good cheer, this honest and fearless Huguenot was a barber-surgeon as those who practised surgery were then called. The internists were as haughty as they were ignorant, and looked down on their colleagues the surgeons. We all know with what irony Molière later depicted these gentry in *Le Malade Imaginaire*. The best they could advise, so far as therapeutics went, was *saignare, purgare and clystare*.

Paré had a decidedly inventive mind. Up to his time after an amputation the surgeon used to pour boiling oil over the stump and cauterize it with a red hot iron to stop the flow of blood. One can easily imagine the agonizing pain suffered by the patient. Paré had the luminous idea of using the garotte. Then to prevent post-operative bleeding he inaugurated something new. He was then acting as military surgeon at the siege of Metz and there for the first time he used a clamp to seize the bleeding vessels and then ligated them. All this seems so very simple to us but it was a major novelty in those days. History tells us that the night following this new departure he lay sleepless in his tent. Rising early he went to see his patients and found them resting in relative comfort whilst those who had been cauterized and had boiling oil sprinkled were rolling in anguish on their couches. So this was the point of departure of the use of the force-pressure clamp and the ligating of the arteries. So Paré can truly be said to be one of the few medical men who were true benefactors of suffering humanity. With him one can class Hippocrates, who liberated the profession from the grasp of the Aesclepiades, Jenner and Pasteur who led us on the road of a new therapeutical method; Morton who discovered the use of general anaesthesia by ether; and Lister, who renovated surgery. These men may truly be looked upon as real benefactors of humanity at large.

## Association Notes

### THE SEVENTY-SECOND ANNUAL MEETING

of the

## Canadian Medical Association

TO BE HELD IN WINNIPEG, JUNE 23, 24, 25, 26, 27, 1941

Convention Headquarters—Royal Alexandra Hotel

<i>President</i>	- - -	DR. DUNCAN GRAHAM, Toronto
<i>President-Elect</i>	- - -	DR. GORDON S. FAHRNI, Winnipeg
<i>General Secretary</i>	- - -	DR. T. C. ROUTLEY, Toronto

Plans for the Seventy-second Annual Meeting, to be held in Winnipeg during the week of June 23rd next, are progressing most satisfactorily.

The Central Program Committee, under the Chairmanship of Dr. Duncan Graham, with valuable aid from the Local Program Committee in Winnipeg, has arranged a scientific program which should attract a large attendance.

General Council will meet on Monday and Tuesday.

On Tuesday afternoon both the Manitoba and Saskatchewan Divisions of the Association will hold their annual meetings.

The fourth annual conference of Medical Secretaries will be held on Monday evening.

The Canadian Medical Protective Association will hold its Annual Meeting at the close of the luncheon on Friday.

On Tuesday evening, members of General Council will be dinner guests of their Manitoba hosts.

Round-Table Conferences, instituted so successfully two years ago, will be continued this year on the mornings of Wednesday, Thursday and Friday, from nine to ten o'clock.

General Sessions will be held on Wednesday, Thursday and Friday mornings from 10.15 o'clock until 12.00 noon.

The various sections will hold their meetings on the afternoons of Wednesday, Thursday and Friday.

The Annual General Meeting will be held on Wednesday night.

Once again, as at the Toronto meeting, Thursday night has been given over to a dinner meeting under the auspices of the Committee on Medical Economics, of which Dr. Wallace Wilson, of Vancouver, is the Chairman.

Golfers are reminded that the Golf Tournament will be held all day Tuesday, when play for the beautiful Ontario Cup and other prizes will take place.

All the meetings will be held in the Royal Alexandra Hotel. The management has very kindly placed at our disposal the entire facilities of the hotel, thus affording splendid accommodation for all our requirements.

### COMMITTEE ON ARRANGEMENTS

*Chairman*

THE PRESIDENT-ELECT, DR. G. S. FAHRNI

*General Secretary*

DR. T. C. ROUTLEY, TORONTO

*Local Honorary Secretary*

DR. A. W. S. HAY

### Chairmen and Secretaries of Committees

BADGES AND SIGNS—DR. A. BLONDAL, *Chairman*.  
DR. L. A. SIGERDSON, *Secretary*.

COMMERCIAL EXHIBITS—DR. E. H. ALEXANDER, *Chairman*.  
DR. H. MEDOVY, *Secretary*.

ENTERTAINMENT—DR. H. D. KITCHEN, *Chairman*.  
DR. A. M. GOODWIN, *Secretary*.

GOLF—DR. G. L. ADAMSON, *Chairman*.  
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*Continued.*

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## GENERAL SESSIONS

*Speakers and Subjects as Arranged to Date*

Valedictory Address by the President

Dr. Duncan Graham, Toronto.

Dr. William F. Braasch, Rochester, Minn.

The surgical kidney as a factor with hypertension.

Dr. Charles Hunter, Winnipeg

Dizziness from the internist's standpoint.

Dr. F. W. Jackson, Winnipeg

Some observations on maternal care.

Dr. A. F. Menzies, Morden

Post-war medical problems.

Dr. Gavin Miller, Montreal

Recent advances in the surgical approach to carcinoma of the large bowel and rectum.

Dr. Rustin McIntosh, New York

Jaundice.

Dr. Kenneth G. McKenzie, and

Dr. E. H. Botterell, Toronto

The common neurological syndromes produced by pressure from extrusion of the intervertebral disc. (Illustrated by coloured film).

Dr. G. E. Richards, Toronto

Ten years' progress in the radiotherapy of oral cancer. Present methods and present results.

Dr. C. D. Parfitt, Toronto

The Osler Lecture.

Dr. Wallace Wilson, Vancouver

Whither Medicine!

Dr. Ralph M. Tovell, and

Dr. Curtiss B. Hickcox, Hartford, Conn.

The present status of cyclopropane.

## SECTIONAL MEETINGS

## Section of Anæsthesia

Dr. D. H. Huggins, Winnipeg

Avertin in neuro-surgery.

Dr. D. G. Revell, Winnipeg

Ether, the all-purpose anæsthetic.

Dr. H. V. Rice, Winnipeg

Newer concepts of anæsthetic physiology.

Dr. C. H. Robson, Toronto

Anæsthesia for children (illustrated by coloured film).

Dr. R. M. Tovell, and

Dr. A. W. Friend, Hartford, Conn.

The control of physical hazards of anæsthesia.

Section of Anæsthesia—*Continued.*

Symposium on Spinal Anæsthesia

Dr. Byron R. Burwash, Saskatoon  
Analeptics.

Dr. I. H. Davidson, Winnipeg

Pre-medication.

Dr. K. E. Hollis, Toronto

Indications and contraindications.

Dr. H. J. Shields, Toronto

Physiology.

Dr. G. D. Stanley, Calgary

Post-operative sequelæ.

Dr. J. E. Murphy, Regina

Agents.



**Section of Historical Medicine**

- Dr. William Boyd, Toronto  
The evolution of medical science.
- Dr. J. H. Elliott, Toronto  
Osler's class at the Toronto School of Medicine.
- Dr. W. A. Gardner, Winnipeg  
Dr. O'Reilly, Napoleon's physician at St. Helena.
- Dr. J. A. Gunn, Winnipeg  
Ambroise Paré as a military surgeon.
- Dr. J. C. Hossack, Winnipeg  
History of the plague.
- Dr. D. S. Maenab, Calgary  
Hugh Owen Thomas.
- Dr. A. G. Nicholls, Montreal  
Herba panacea.
- Dr. N. R. Rawson, Winnipeg  
William Farr, founder of vital statistics.
- Dr. D. G. Revell, Edmonton  
The first twenty-five years of anatomy teaching in Alberta.

**Section of Medicine**

- Dr. G. F. Amyot, Victoria  
Public health and the private practice of medicine.
- Dr. Eldon M. Boyd, Kingston  
Expectoration, expectorants and cough medicines.
- Dr. William Boyd, Toronto  
Changing views regarding pyelonephritis.
- Dr. F. T. Cadham, Winnipeg  
Vaccine therapy in arthritis.
- Dr. R. J. Collins, East Saint John  
Problems arising in rehabilitation schemes for the tuberculous.
- Dr. J. H. Geddes, London  
What is colitis?
- Dr. Wallace Graham, and  
Dr. A. A. Fletcher, Toronto  
Gold therapy in chronic arthritis.
- Dr. F. C. Heal, Moose Jaw  
The management of common disorders of cardiac rhythm.
- Dr. E. S. Mills, and  
Dr. E. S. Murray, Montreal  
The relative value of the various sulphonamide drugs in the treatment of acute respiratory infections including pneumonia.
- Dr. J. M. McEachern, Winnipeg  
Coronary disease in Manitoba.

**Section of Medicine—Continued.**

- Dr. D. S. McEwen, Winnipeg  
Upper respiratory infection in general practice.
- Dr. Harris McPhedran, Toronto  
Cardiovascular disease associated with toxic goitre.
- Dr. Trevor Owen, Toronto  
Fatigue, rest and exercise.
- Dr. T. A. Pinecock, Brandon  
Transitions in psychiatry.
- Dr. John W. Scott, Edmonton  
The natural history of migraine.
- Dr. S. E. C. Turvey, Vancouver  
Asymptomatic neurosyphilis.

**Section of Military Medicine**

Symposium—Medical aspects of casualties returning from overseas.

**Introduction—**

Lieut.-Colonel A. M. Davidson, President,  
Standing Medical Board, No. 10 Detachment, R.C.A.M.C., M.D. 10.

**Medical Cases—**

Captain H. S. Atkinson, No. 10 Detachment, R.C.A.M.C.

Dr. J. D. Adamson, Medical Staff,  
D.P.&N.H., Winnipeg.

**Surgical Cases—**

Lieut.-Colonel T. E. Holland, R.C.A.M.C.,  
Officer Commanding, Fort Osborne  
Military Hospital, M.D. 10.

Dr. J. A. Gunn, Surgeon, D.P.&N.H.,  
Winnipeg.

**Eye, Ear, Nose and Throat Cases—**

Major H. G. Grieve, No. 10 Detachment,  
R.C.A.M.C.

**Problems of Army Hygiene**

Major M. R. Elliott, District Hygiene  
Officer, No. 10 Detachment, R.C.A.M.C.

**Special problems of the R.C.A.F. Medical Officer**

Wing-Commander G. E. Hall, Ottawa.

**Section of Obstetrics and Gynaecology**

Dr. L. C. Conn, and  
Dr. J. R. Vint, Edmonton

**Uterine prolapse.**

Dr. Léon Gérin-Lajoie, Montreal

Contribution to the surgery of the pre-sacral  
nerve in gynaecological ailments.

Dr. W. S. Holmes, Saskatoon

Induction of labour—indications, methods  
and dangers.



**Section of Obstetrics and Gynaecology—***Continued.*

- Dr. P. J. Kearns, Montreal  
Anatomical changes in the lower uterine segment in pregnancy and labour.
- Dr. John Mann, Toronto  
Toxæmia of pregnancy; present day classification; etiology and treatment.
- Dr. F. G. McGuinness, Winnipeg  
The obstetrical significance of intra-cranial injury of the newborn, based on 300 autopsies.
- Dr. A. B. Nash, Victoria  
Treatment of acute and chronic salpingitis.
- Dr. N. W. Philpott, Montreal  
Anæsthesia and analgesia in obstetrics with particular reference to the use of local anæsthesia.
- Dr. C. R. Rice, Winnipeg  
Disturbances of menstrual function in tuberculous patients.

**Section of Ophthalmology**

- Dr. K. J. Austmann, Winnipeg  
Glaucoma.
- Dr. D. M. Genoff, Winnipeg  
Senile cataract.
- Dr. H. O. McDiarmid, Brandon  
Intraocular tumours.
- Dr. F. D. McKenty, Winnipeg  
The results of tarsectomy and a simplification of the technique.
- Dr. Fred T. Tooke, and  
Dr. John V. Nicholls, Montreal  
The incidence and character of hæmorrhages occurring in the retina in diabetes.

**Section of Otolaryngology**

- Dr. G. W. Fletcher, Winnipeg  
Tumours of the larynx—diagnosis and treatment.
- Dr. Keith Hutchison, Montreal  
Acute otitic meningitis; chemotherapy advances.
- Dr. Gregor McGregor, Toronto  
Bronchoscopy—a safeguard against diagnostic errors.
- Dr. George Tremble, Montreal  
Irrigation of the sphenoid sinuses—a safe and simple method (illustrated by coloured film).
- Dr. E. J. Washington, Winnipeg  
Intracranial complications of otogenous origin with review of cases.
- Clinical presentation of cases at the General Hospital and St. Boniface Hospital.

**Section of Pædiatrics**

- Dr. A. R. Birt, Winnipeg  
Troublesome skin diseases in infancy and childhood.
- Dr. Alan Brown, Toronto  
Diarrhœa.
- Dr. Alfred Deacon, Winnipeg  
Rehabilitation of poliomyelitis cases.
- Dr. Donald Fraser, Toronto  
Prophylactic immunization in children.
- Dr. U. J. Gareau, Regina  
Acrodynia.
- Dr. Alton Goldbloom, Montreal  
Staphylococcus septicæmia.
- Dr. K. B. Leslie, Winnipeg  
Medication before and after anæsthesia in children.
- Dr. L. M. Lindsay, and  
Dr. F. W. Wigglesworth, Montreal  
Purpura fulminans.
- Dr. H. S. Little, London  
Chemotherapy of meningococcal meningitis.
- Dr. Rustin McIntosh, New York  
Nephritis.
- Dr. Graham Ross, Montreal  
The use of vitamin K in pædiatric practice, with special reference to the newborn period.
- Dr. R. R. Struthers, Montreal  
The significance of rheumatic nodules.
- Dr. F. F. Tisdall, Toronto  
War and post-war problems regarding childhood nutrition.

**Section of Radiology**

- Dr. L. J. Carter, Brandon  
Radiological examination of the terminal ileum and proximal colons—a twenty-five year résumé.
- Dr. A. D. Irvine, Edmonton  
Coarctation of the aorta, radiologically considered.
- Dr. Herve Lacharité, Montreal  
Osteochondritis dissecans.
- Dr. W. H. McGuffin, Calgary  
Radiological evidence as a diagnostic aid in diseases of the heart.
- Dr. C. B. Peirce, and  
Dr. Arthur T. Henderson, Montreal  
X-ray therapy in intractable asthma.

**Section of Radiology—Continued.****Symposium on Carcinoma of the Cervix****Anatomy—**

Professor I. Maclaren Thompson,  
Winnipeg.

**Pathology—**

Dr. Sara Meltzer, Winnipeg.

**Radium—**

Dr. Ethlyn Trapp, Vancouver.

**X-radiation—**

Dr. A. W. Blair, Regina.

**Metastasis and management—**

Dr. B. R. Mooney, Winnipeg.

**Complications following radiation treatment in carcinoma of the cervix—**

Dr. W. G. Cosbie, Toronto.

**Section of Surgery**

Dr. A. C. Abbott, Winnipeg

Inguinal hernia with special reference to recurrence.

Dr. C. W. Burns, Winnipeg

Surgical management of traumatic abdomen.

Dr. Walter G. Carseadden, Toronto

Injuries of the hand.

Dr. W. F. Gillespie, Edmonton

The treatment of perianal abscess and fistula.

Dr. Chas. W. Harris, Toronto

Injuries about the ankle joint.

Dr. Robert C. Laird, Toronto

The diagnosis and treatment of bronchiectasis.

Dr. R. K. Magee, Peterborough

Subphrenic abscess.

Dr. Herbert Meltzer, Ninette

181 cases of thoracoplasty.

Dr. H. F. Moseley, Montreal

Shoulder pain.

Dr. M. R. MacCharles, Winnipeg

Causes of poor results in biliary tract surgery.

Dr. Lorne H. McConnell, Saskatoon

Epilepsy—analysis of the results of 91 craniotomies.

Dr. J. S. McEachern, Calgary

Some surgical problems arising from developmental errors.

Dr. O. W. Niemeier, Hamilton

Obstructive jaundice.

**Section of Surgery—Continued.**

Dr. George Ramsay, London

Anterior poliomyelitis; observations on recovery rate of paralyzed muscles.

Dr. Fulton Risdon, Toronto

The present status of the treatment of hare lip and cleft palate deformities.

Dr. Dudley E. Ross, and

Dr. J. H. Palmer, Montreal

The surgical treatment of patent ductus arteriosus.

**Section of Urology**

Dr. E. D. Busby, London

Present status of chemotherapy in urinary infections.

Dr. W. F. Braasch, Rochester, Minn.

Prognosis in non-surgical bilateral renal tuberculous.

Dr. W. A. Dakin, Regina

Pathology of some unusual types of gross renal hæmorrhage.

Dr. Earl Hall, Vancouver

Carcinoma of the penis.

Dr. J. C. McClelland, Toronto

Anuria.

Dr. Frank S. Patch, and

Dr. J. T. Codnere, Montreal

Treatment of hydronephrosis secondary to aberrant renal vessels.

Dr. Frederick Pilcher, Calgary

Transurethral prostatic resection.

Dr. Emerson Smith, Montreal

Experiences with interstitial cystitis

Dr. C. B. Stewart, Winnipeg

Persistent Wolffian duct—report of cases.

Dr. G. N. Tucker, Edmonton

Recumbency urolithiasis.

**Medical Economics**

Municipal doctor system in Saskatchewan

Dr. R. O. Davison, Regina.

What is an adequate medical service?

Dr. E. S. Moorhead, Winnipeg.

Some of the weaknesses observed in health insurance plans which have been studied.

Dr. T. C. Routley, Toronto.

Summary

Mr. Hugh H. Wolfenden, Toronto, Consulting Actuary of the Association.

## ROUND-TABLE CONFERENCES

### Subjects and Chairmen

#### Medicine

Migraine

Dr. G. L. Adamson, Winnipeg.

Normal blood pressure variations

Dr. L. G. Bell, Winnipeg.

Prevention of common cold

Dr. William Wood, Winnipeg.

#### Obstetrics and Gynæcology

Management of ante- and post-partum hæmorrhage

Dr. Ross Mitchell, Winnipeg.

Carcinoma of the uterus

Dr. J. D. McQueen, Winnipeg.

#### Ophthalmology

Orthoptic treatment of strabismus

Dr. F. A. McNeil, Winnipeg.

Corneal lesions

Dr. J. T. Cruise, Winnipeg.

#### Otolaryngology

Upper respiratory infections

Dr. Robert Black, Winnipeg.

#### Pædiatrics

Chronic cough in childhood

Dr. O. J. Day, Winnipeg.

Genito-urinary infections in childhood

Dr. C. B. Stewart, Winnipeg.

#### Surgery

Fractures

Dr. A. Gibson, Winnipeg.

Acute appendicitis

Dr. P. H. T. Thorlakson, Winnipeg.

Tumour clinic

Dr. Daniel Nicholson, Winnipeg.

#### Urology

Bladder tumours

Dr. H. D. Morse, Winnipeg.

The present status of endocrine therapy in urology

Dr. C. B. Stewart, Winnipeg.

## TRANSPORTATION

Identification certificates may be obtained from the office of the General Secretary, 184 College Street, Toronto. These certificates entitle the purchaser to round-trip fare at one and one-third of the adult normal one-way first class or coach fare, plus 25 cents. Tickets are good going and returning via same route, or

going via one authorized route and returning via any other authorized route. Return limit, thirty days, in addition to date of sale. Passengers must reach original starting point not later than midnight of final return limit.

Dates of sale:

From Ontario (Port Arthur, Armstrong and West), Manitoba Saskatchewan, Alberta and British Columbia—June 17th to 23rd (both dates inclusive).

From Ontario (east of Port Arthur and Armstrong), Quebec, New Brunswick, Nova Scotia, and Prince Edward Island, June 16th to 24th (both dates inclusive).

## Hospital Service Department Notes

### Hospital Staff Meetings

Hospital staff meetings and sessions of clinical societies in hospitals take various forms, some more interesting than others. The problem is to provide a program that will be sufficiently varied to appeal to all, proceed without lag, and provide "something different". One of the most intensely interesting meetings attended in many years took place recently at the Royal Victoria Hospital in Montreal and illustrated a type of program which might well be considered for adoption on occasion in other hospitals. This particular gathering was a hospital meeting of the Montreal Medico-Chirurgical Society.

A large ward had been specially set up for the occasion. Cases for demonstration occupied the various beds on each side. The doctor demonstrating each case remained close by to point out the features of the disease and to explain charts, photographs, and other data arranged on the walls behind the patient. Where necessary, microscopes or biopsy material were set up on the bedside table. The centre of the ward was filled with x-ray view boxes, photographs, and other exhibits. At the far end of the ward a projection machine showed coloured moving pictures prepared by various members of the staff. The side rooms leading from the corridor contained pathological, ophthalmic, gynæcological and other exhibits. All exhibits, whether of patients or of laboratory preparations, were adequately labelled with titular or explanatory signs. Altogether some forty-six different exhibits were presented.

On arrival, each visitor was handed an extensive, hectographed program, giving a diagram of the ward and setting forth the particular title and the name of the doctor in charge of each of the forty-six exhibits. This program also gave a synopsis of each of the exhibits and the case

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, 184 College Street, Toronto.





In the German air raids last autumn, St. Thomas's Hospital, one of the oldest and best-known teaching hospitals in Britain, was badly damaged by three direct hits in six days, but, by scattering its medical students among other hospitals according to a prearranged plan, was able to start the 1940 session of its medical school on the usual day. One of its officials remarked after the bombings: "We do not intend to be pushed out by Hitler or anyone else." The teaching of medical students throughout England has been reorganized with this aim in view, distributing much of the work over many hospitals, instead of, as formerly, having it concentrated in a few.—From *Medical Care*, New York.

### Cerebrospinal Meningitis

We are now entering on the season when an increase in the incidence of cerebrospinal meningitis is to be expected; and a rise is in fact occurring, though so far it is relatively small. It may therefore be of some interest to note the lessons that we learned during the major outbreak that occurred in the winter and spring of last year. The essential fact that emerged from that experience was the vital importance of early diagnosis. It is clear that the sulphonamide compounds, and particularly, perhaps, sulfapyridine, have placed in our hands a remedy which, if it is used in time, will reduce the mortality from this disease to a small fraction of its former dimensions. It is easier to secure early diagnosis among troops under discipline than among the civil population, if only because in civilian life the doctor may be called in too late; and the experience of last spring made it clear that many lives were being lost that would have been saved if treatment had been instituted more promptly. The practitioner can play a vital part in reducing the case mortality from this disease by exercising a constant watchfulness for the earliest symptoms, by having the cerebrospinal fluid tested promptly in any doubtful case, and by giving precautionary and adequate doses of sulfapyridine, or of sulfanilamide, while a bacteriological diagnosis is being established. Care should, of course, be taken to discontinue the drug if the laboratory findings are negative, and to inform any hospital to which a case is admitted of the exact doses that have already been given. The other lesson that we learned last year, though many had taught it before, was the uselessness of swabbing contacts. It has become clear that carrier rates of 50 per cent or more may be found in large sample swabbings of aggregations of men among whom few or no cases are occurring. In these circumstances the isolation of a few unfortunate carriers will produce no significant decrease in the risk of infection to which others are subjected; while the inconvenience and mental

distress resulting from such isolation are by no means negligible. Beyond sending to hospital or isolating the actual case our efforts may be confined to the avoidance of overcrowding, and to any other procedure that is likely to reduce the risk of the passage of bacteria from one person's nasopharynx to that of another. In the light of our present knowledge the swabbing of contacts should be discontinued.—*Brit. M. J.*, 1941, 1: 164.

### Military Medicine

It is natural, when most doctors are either on war service or concerned with the results of the air war on civilians, that there should be an increasing demand for papers on all aspects of war medicine. American doctors, though not directly involved, are aware of the virtue of military preparedness, and for their information the Medical Library Association has begun to publish a column on military medicine in each issue of its quarterly *Bulletin*. This is not an abstract of current periodicals, such as the Medical Research Council is giving us in its new *Bulletin of War Medicine*, but a survey of publications on military medicine with a commentary. It is designed as a guide for the librarian who caters for the medical public, but it should prove equally valuable to all users of medical libraries. Our own librarians, preoccupied with safeguarding their collections from the dangers of air-raids, will probably read as a counsel of perfection the association's advice, that "every library should set aside a section of its main reading-room for military medicine, where the doctor should find both old and new, publications from World War I, current military journals, reference lists of important advances in military medicine, in the care of civilians under war conditions, aviation medicine, gas warfare . . ." and so on. The Association leads the way by printing a list of thirty-three current periodicals of military medicine. Half of these, however, come from enemy or occupied countries and must be almost as difficult to obtain in America as here. The Association also describes the steps being taken by the National Research Council in Washington to collect all relevant material for compiling the medical history of the present world upset as it affects America. We may hope that here in the centre of the battle someone has had the foresight to begin a similar collection.—*The Lancet*, 1941, 1: 20.

### Army Footwear

That the famed marching ability of the German infantry is due not only to the physique of the men and their training, but also to the relative efficiency of their footwear, which combines comfort with protection and freedom of action to the leg, is a fact stated by Dr. K. Vernon Bailey, M.C., in the *Journal of the Royal Army Medical Corps*. When pointing out that

much has been written about the mechanization of the army, he recalls that marches of over 30 miles a day were made by the highly mechanized German forces in the Polish campaign, and suggests that the ability of British infantry to make forced marches may be put to the test in this war.

Dr. Bailey maintains that army footwear should not constrict the leg and it should afford protection against damp and cold. He points out that in spite of mechanization and permanent fortifications British infantry will have to encounter mud during the forthcoming winter and that the "battle" dress with gaiter or short puttee will afford even less protection than the full puttee which kept a certain amount of damp out for a short time but which caused varicose veins, rheumatism, and "trench foot" when it became soaked and could not be removed and dried. To those with experience of the Ypres salient the losses from these causes were as devastating and dangerous to the morale as those produced directly by the enemy. The "battle" dress with gaiter or puttee will afford even less protection. The lower end of the trousers will become eaked with mud which will infiltrate through the top of the boot to the foot inside.

Dr. Bailey suggests it is essential that the foot and leg of the infantryman be uniformly protected as far as possible from damp and cold, and that there should be no constriction of the leg itself. He regards the gaiter as not being sufficiently a part of the boot at the instep and as not covering the leg to a sufficient height, and he has devised a modified army boot which he describes as comfortable, weatherproof, and capable of being made waterproof by the application of dubbin or oil.—From the *Journal of the Royal Institute of Public Health and Hygiene*.

### "Shelter Legs"

According to *The Lancet*, people suffering from swollen legs began to appear in doctors' consulting rooms within a few weeks of the bombardment of London. Elderly women seem to be most commonly affected, but cases also occur in men and young people. The use of deck chairs in shelters is suspected as a likely cause of the trouble because the wooden cross bar causes pressure on the back of the thighs or on the popliteal vessels, and because the same condition has been noted after long sea voyages when much time has been spent in deck chairs, and also after flying home from Cape Town, the aeroplane seats being rather low and of a similar pattern to a deck chair. It is suggested that the only way to prevent "shelter legs" is for people, particularly if they are elderly or obese, not to sit all night as well as during the day, but to make a point of getting their feet up for several hours out of the twenty-four.—*J. Roy. Inst. of Pub. Health & Hygiene*, 1941, 4: 3.

## War Literature

### THE BRITISH MEDICAL JOURNAL

- Blast Injuries (annotation), 1941, 1: 89.
- Wartime Medicine in the U.S.A. (annotation), 1941, 1: 90.
- Problems of Blast Injuries, (report of Society), 1941, 1: 94.
- War Strain in Evacuated Children, Miss A. T. Alcock, 1941, 1: 124.
- War Strain in Evacuated Children (leading article), 1941, 1: 128.
- Active Immunization: Some Present-day Problems (Rep. of Societies), 1941, 1: 130.
- Lice and Disease (leading article), 1941, 1: 199.

### GUYS' HOSPITAL GAZETTE

- Ophthalmic Injuries in Warfare, Frank W. Law, 1941, 55: 15.

### JOURNAL OF AVIATION MEDICINE

- Medical and Sanitary Care of the Civilian Population Necessitated by Attacks from Hostile Air Craft, G. E. Ledfors, 1940, 11: 143.
- Effects of Anoxia in High Altitude Flights on the Electrocardiogram, M. S. White, 1940, 11: 166.
- Military Aviation Medicine as related to National Defence, D. N. W. Grant, 1940, 11: 197.
- Evaluation of Aptitude for Flight Training, R. B. Bigelow, 1940, 11: 202.

### JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

- Gunshot Wounds of the Head in 1940, Hugh Cairns, 1941, 76: 12.

### JOURNAL OF THE ROYAL SANITARY INSTITUTE

- Food Poisoning, W. M. N. Mason, 1941, 61: 69.

### THE LANCET

- Dressing of War Wounds with Tulle Gras, D. N. Matthews, 1941, 1: 43.
- The Control of the Bed Bug, J. R. Busvinè, 1941, 1: 55.

### THE MILITARY SURGEON

- Nutrition and National Defence, M. L. Drazin, 1941, 88: 39.
- Prevention and Treatment of Shock in the Combat Zone, D. B. Kendrick, Jr., 1941, 88: 97.
- Discussion of above, J. A. Mattison, 1941, 88: 114.

### BOOKS AND PAMPHLETS

- Nutrition and the War, Geoffrey Bourne, Cambridge University Press, London, 1940, price 3/6.

### A Chant of Love for England

The following poem has a singular appropriateness and appeal at the present time. It is by Helen Gray Cone, formerly Professor of English in Hunter College, New York, and was intended as a reply to Lissauer's "Hymn of Hate". It was first published in *The Atlantic Monthly* for February, 1915, and may be found in Volume I of "War Treasury" (Houghton, Mifflin Co.) and Cone's "Harvest Home" (G. P. Putnam's Sons, N.Y.). Professor Cone died in 1934.

## A CHANT OF LOVE FOR ENGLAND

By Helen Gray Cone

A song of hate is a song of hell.  
Some there be that sing it well.  
Let them sing it, loud and long,  
We lift our hearts in a loftier song.  
We lift our hearts to heaven above,  
Singing the glory of her we love . . .

England!

Glory of thought and glory of deed,  
Glory of Hampden and Bunyonside;  
Glory of ships that sought far goals,  
Glory of swords and glory of souls!  
Glory of songs mounting as birds,  
Glory immortal of magical words;  
Glory of Milton, glory of Nelson,  
Tragic glory of Gordon and Scott;  
Glory of Shelley, glory of Sidney,  
Glory transcendent that perishes not.  
Hers is the story, hers be the glory . . .

England!

Shatter her beautiful heart ye may,  
The Spirit of England none can slay!  
Dash the bomb on the dome of Paul's,  
Doom ye the fame of the Admiral fall!  
Pry the stone from the chancel floor . . .  
Dream ye that Shakespeare shall live no more!  
Where is the giant that that kills  
Hordworth walking the old green hills?  
Trample the red rose on the ground . . .  
Keats is beauty while earth spins round!  
Bind her, bind her, burn her with fire,  
Cast her ashes into the sea . . .  
She shall escape, she shall aspire,  
She shall rise to make men free;  
She shall rise in a sacred scorn,  
Lighting the lives that are yet unborn;  
Spirit eternal, splendour eternal . . .

England!

## Medical Societies

## The Clinical Surgical Society of Western Canada

At a meeting of representative surgeons from the three Prairie Provinces, held at the Winnipeg General Hospital on February 7th and 8th, an organization was formed and given the official title of The Clinical Surgical Society of Western Canada. Officers elected to appointments were: *President*—Dr. G. S. Waugh, Winnipeg; *Secretary-treasurer*—Dr. M. R. McCharles, Winnipeg. Elected Provincial representatives were: Alberta—Dr. A. R. Munroe, Edmonton; Saskatchewan—Dr. E. B. Alport, Regina; Manitoba—Dr. C. W. Burns, Winnipeg. About twenty surgeons were present. Clinics were given, papers on assigned subjects were read, and discussions on clinical matters took place. The group decided that the next meeting would be held in Winnipeg in 1942 and thereafter in the other provinces in definite rotation.

ROSE MURCHELL

## The Saint John Medical Society

The monthly meeting of the Saint John Medical Society was held in the Admiral Beatty Hotel on February 25, 1941. The special speaker for the evening was Dr. J. R. Nugent. He reviewed the subject of empyema with particular reference to the bacteriological causation, the optimum time for operation, and the type of drainage required in a variety of cases. The discussion was most opportune as there has been a slight increase in the incidence of empyema following influenza and measles. Discussion was general and on the whole very constructive.

## Société médicale des hôpitaux universitaires de Québec

Une séance de la société eut lieu à la Clinique Roy-Rousseau, Mastoï, près Québec, le 7 février 1941. Suivent les résumés des travaux.

## ASPECT MÉDICAL DU MONGOLISME.—J. C. Miller.

L'auteur préfère mongolisme à idiotie mongolienne des anciens traités, parce que l'affection n'implique pas souvent l'amentia véritable, et aussi parce que le traitement médico-pédagogique peut déterminer des améliorations très considérables.

Dans une étude élaborée sur quarante-cinq observations personnelles, l'auteur discute l'étiologie, la pathogénie, le diagnostic et le traitement du mongolisme; il suggère aux médecins-praticiens et aux pédiatres d'insister un traitement précoce chez le tout jeune enfant; la persévérance du traitement lui paraissent en effet être les grandes conditions du succès dans l'assistance à cette variété d'anomalie congénitale.

## INSUFFISANCE SURRÉNALE AIGUE CHEZ UN MALADE PRÉSENTANT UNE TUBERCULOSE BILATÉRALE DES CAPSULES SURRÉNALES.—Mathieu Samson et Sylvio Caron.

Un jeune homme de 23 ans, d'une bonne santé apparente, à la suite d'exercices athlétiques, devient subitement agité, délirant; il se présente comme un intoxiqué. Quelques heures après il tombe dans le coma et meurt. Une autopsie révèle la présence d'une tuberculose fibro-caséuse bilatérale des capsules surrénales, sans que l'on constate de lésions tuberculeuses évolutives au niveau d'autres organes.

Les auteurs concluent à la nécessité des autopsies pour établir les causes véritables de la mort, surtout dans les cas de mort suspecte.

## RAPPORT STATISTIQUE SUR LA THÉRAPIE PAR LE MÉTRAZOL DEPUIS 21½ ANS À L'HÔPITAL ST-MICHEL-ARCHANGE DE QUÉBEC.—Lucien LaRue et L. Patry.

	Gutris	Amidobis	Stot	Lablès	Total	Décès
Rapport général de l'an dernier.	82	101	69	153	186	0
Total . . . 255	32.1%	40.9%	27%	60%	73%	
Hommes traités en 1940 . . . . .	38	23	17	56	61	0
77	50%	31%	19%	72%	80%	
Femmes traitées en 1940 . . . . .	51	40	26	80	91	0
120	43%	33%	22%	67%	78%	
Grand total . . . . .	171	167	111	289	311	0
152	38%	36.7%	21.5%	64%	75.4%	



La thérapeutique par le métrazol continue à donner des résultats très encourageants. L'expérience acquise depuis deux ans et demi par ce traitement nous permet de conclure qu'il est un mode de traitement actif, facile, sans danger sérieux, s'il est fait en milieu spécialisé. Il s'applique à une grande catégorie de maladies mentales en autant qu'elles sont récentes, parfois il donne des résultats inespérés. La psychothérapie au cours et après le traitement nous paraît être de grande utilité.

L'accident toujours à craindre demeure la fracture de la colonne par écrasement du corps vertébral. L'anxiété qui précède l'injection est l'objet d'études spéciales actuellement, et nous espérons pouvoir bientôt obvier à cet inconvénient. Cette thérapeutique est appelée à donner des résultats également dans les cas d'alcoolisme aigu avec coma, ou encore avec agitation intense.

#### L'ANXIÉTÉ ET LE MÉTRAZOL.—Sylvio Caron et Charles-A. Martin.

Les médicaments qui, administrés à dose inusitée, engendrent des représentations mentales étranges et excitent anormalement le système vago-sympathétique, produisent par là de l'anxiété et de l'angoisse. Le métrazol donné à dose convulsivante et surtout à dose subconvulsivante réalise ces conditions. Une description est faite des sensations éprouvées et des réactions anxieuses qui en découlent, au moment de l'injection et dans les intervalles du traitement. Ces réactions anxieuses sont représentées comme la complication principale du traitement parce que préjudiciables au patient, gênantes pour le personnel médical, nuisibles à l'application judicieuse et effective de la méthode. De plus l'anxiété semble augmenter la résistance au métrazol et ne permet pas toujours de protéger la colonne vertébrale.

Une discussion est faite de la prétendue vertu thérapeutique de la peur, qui est niée par plusieurs auteurs américains qui se sont intéressés à la question; par le fait que le métrazol peut guérir des anxieux à condition qu'ils fassent des convulsions et que les convulsions produites par l'électricité sans réaction anxieuse, suivant la méthode de Cerlatti et Bini, se sont montrées aussi effectives que la thérapeutique par le métrazol.

Parmi les diverses thérapeutiques proposées pour éliminer l'aura anxieuse la scopolamine, employée seule ou associée à la morphine, s'est montrée très efficace dans la correction du problème de l'anxiété sans nuire à l'action convulsivante du métrazol, qu'elle semble au contraire faciliter. Un tableau est fait de l'amélioration des conditions du traitement après prémédication par le H.M.C. employé routinièrement depuis un an.

RICHARD LESSARD,  
Secrétaire.

#### The Winnipeg Medical Society

Prof. J. S. McCartney, University of Minnesota, addressed the Winnipeg Medical Society, March 6th, on Thrombosis and Embolism. Dr. Digby Wheeler, President of the Society, was in the chair. Professor McCartney said that one hundred years ago Virchow had laid down the concept of pulmonary embolism as a detached thrombus being carried by the circulation along a pulmonary artery, usually the right, until it became arrested. This concept was challenged, but Virchow proved its correctness by experiments in which he introduced various foreign bodies into the veins of animals and recovered them in the lungs. At first only medical causes, e.g., typhoid, were concerned in the formation of thrombi but after 1846 laparotomies produced thrombosis. The exact cause of death from pulmonary embolism had not yet

been determined. Emboli sometimes come in showers. The possible sources of emboli can be established by present day methods of autopsy only in about two out of three cases. Were complete dissection permitted the primary site might be found in almost all instances.

In the development of a thrombus these various factors must be considered: slowing of circulation from cardiac conditions or splinting of the abdomen and relative inactivity; damage to endothelium from injury, or bacterial infection; changes in the composition of the blood, obesity, inactivity of age, loss of muscular tone, infection.

In statistical reports, time of life and the site of operation have not been correlated. Removal of large masses of tissues in abdominal operations is particularly harmful.

Professor McCartney praised the work of Professor Best with heparin but he considered the cost relatively high. The incidence of embolism at the Mayo Clinic was less than 1 per cent.

A vote of thanks was moved by Professor D. Nicholson.

## Abstracts from Current Literature

### Medicine

**The Use of Exercise Tests in Connection with Venous Pressure Measurements for the Detection of Venous Obstruction in the Upper and Lower Extremities.** Veal, J. R. and Hussey, H. H.: *Am. Heart J.*, 1940, 20: 308.

Measurement of the pressure in the peripheral veins is generally recognized as a diagnostic procedure of substantial value in a variety of diseases. The authors point out that an elevated pressure in the antecubital veins is sometimes the only means of detecting with certainty the presence of heart failure, and, in obvious cases, of gauging the severity and following its progress. It is similarly useful in cases of acute and chronic cardiac compression. Comparisons of the pressures in the veins of the four extremities are helpful in the localization and diagnosis of arteriovenous fistula and of diseases causing partial or complete occlusion of one of the venæ cavæ or their branches. Venous pressure measurements are useful in the diagnosis of mediastinal lesions (especially mediastinal tumour), pleural and pulmonary diseases which alter the intrapleural pressure, intra-abdominal tumour, cirrhosis of the liver, ascites and localized obstruction of the peripheral veins. It is impossible, however, in some cases, to detect the presence of localized venous obstruction in the upper and lower extremities by measuring the basal venous pressure.

The authors illustrate the comparative effects of "exercise tests" upon the venous pressures

of normal persons, patients with heart failure, and patients with localized venous obstruction, and emphasize their value in demonstrating the presence of the latter. They outline a simple method of measuring the "general" and "local" venous pressures, requiring a 19-gauge needle and a 2 c.c. syringe with a side-arm to which a calibrated glass measuring tube of 4 mm. bore is connected by means of suitable rubber tubing.

W. H. HATFIELD

**Sickle-cell Diseases.** Bauer, J.: *Arch. Surg.*, 1940, 41: 1344.

Sickle-cell anaemia was originally described by Herriek in 1910. Bauer places on record additional data derived from personally studied material, as well as additional conclusions, chiefly therapeutic, derived from these data and from data recorded in the literature.

He observes that sickle-cell anaemia is not infrequently entirely overlooked by the clinician and is discovered only by the pathologist at autopsy. The diagnosis is established by the presence of a small, markedly atrophied spleen, which consists of a mass of partially calcified fibrotic tissue. Errors of diagnosis are not infrequent. The enlarged heart, systolic murmur, and accentuated second pulmonary sound observed in the patient with sickle-cell anaemia, may lead to an incorrect diagnosis of rheumatic mitral lesion. This type of anaemia may account for hypertrophy of the right side of the heart without a valvular lesion. It may be the underlying cause of ulcers of the leg. It may give rise to pains presumably of rheumatic origin in the muscles, bones, and joints. It may also cause so-called abdominal crises which may be diagnosed as acute appendicitis or perforated peptic ulcer.

Patients with sickle-cell anaemia are poor medical and surgical risks. They may succumb to relatively simple disease as acute catarrhal colitis or from appendicectomy or hernioplasty. Clearly established are certain facts concerning the sickling phenomenon. This is dependent solely on the red blood cells.

It does not depend on any peculiarity of the plasma. It is readily demonstrated by a simple laboratory technique. That sickle-cell anaemia is hæmolytic (produced by an exaggerated destruction of red blood cells) is capable of clinical and anatomical proof.

The author discusses at length the pathogenesis of sickle-cell anaemia, clinical signs and symptoms, relation of sickling and sickle-cell disease and therapeutic considerations.

G. E. LEARMONTH

## Surgery

**General Abdominal Lymphadenopathy.** Wilensky, A. O.: *Arch. Surg.*, 1941, 42: 71.

It is recognized that there exists in children and young adolescents, an acute abdominal condition of moderate or severe grade similar

in its general manifestations to appendicitis, diverticulitis, etc., but in which the predominant discoverable observations at operation, consist only of an inflammatory enlargement of the mesenteric and retroperitoneal lymph glands, in the ileocaecal angle.

The patient is usually between three and eighteen years of age. The symptoms of an acute attack are as follows. The patient is seized with abdominal pain of varying severity which can be traced to the right side of the lower part of the abdomen, occasionally extending to the left side. The symptoms are less acute than those of appendicitis or of some other acute intra-abdominal conditions. In the absence of complications there is no boardlike hardness of the abdominal muscles, no Blumberg pain, no Rovsing symptom, no resistance, and no vomiting; there remains only the pain to deep palpation centring about the umbilicus or in the right iliac fossa. Where there is more serious involvement there is evidence of a definite general toxic reaction as shown by a high temperature and a high leucocyte count (20,000 per c/m.) in contrast to the relatively insignificant local symptoms. The inflamed mesenteric gland presents all kinds of non-specific inflammation. The fact that the mesenteric lymphadenitis is always secondary and presents itself with its clinical symptoms as a complete independent picture in which, sometimes the source of infection is veiled or at other times difficult or impossible to locate.

Mesenteric lymphadenitis is thus frequently the first concrete revelation of an intra-abdominal inflammation in a form simulating a mild or symptomless appendicitis, typhlitis or enteritis. The attacks subside as a rule. Seldom can bacteria be demonstrated in the glands and the predominating organism is some strain of streptococcus or occasionally the *Br. melitensis*. Abdominal exploratory operations are more or less frequently necessary in order to establish the true nature of the intra-abdominal condition.

G. E. LEARMONTH

**A Rôle for Surgeons in the Problem of Essential Hypertension.** Heinbecker, P.: *Ann. Surg.*, 1940, 6: 1101.

Les résultats éloignés de la splanchnectomie dans l'hypertension artérielle permet à l'auteur de préciser la valeur de la chirurgie dans ces cas, d'autant mieux que la thérapeutique médicale n'a pas fourni jusqu'à présent de résultats satisfaisants. L'auteur énumère et commente les facteurs qui influencent la pression artérielle normale, dont trois principaux: rôle du système nerveux, rôle des glandes endocrines, et rôle des reins.

Suit un long chapitre sur la pression sanguine dans l'hypertension artérielle où l'auteur développe les idées suivantes: l'état des artères, dans l'hypertension artérielle; les facteurs d'origine nerveuse dans l'hypertension essentielle;

les facteurs endocriniens; le facteur rénal; la fonction synergique d'une substance rénale et de l'adrénaline; les preuves expérimentales; l'effet de l'adrénaline et de l'énervation de la surrénale sur le système nerveux; les résultats cliniques après splanchnectomie. L'auteur relate ensuite 4 observations personnelles d'hypertendus splanchnectomisés bi-latéralement en 1938. Trois opérés restent améliorés 2 ans plus tard; un n'est pas amélioré de son hypertension mais est soulagé des symptômes concomittants. L'un des quatre mourut 2 ans après d'hémorragie cérébrale.

Considérant ces 4 résultats personnels et les symptômes cliniques de ces malades, la splanchnectomie peut donc améliorer l'hypertension lorsque les facteurs nerveux sont surtout en cause au début des troubles, ce que l'on serait porté à croire lorsque la pression systolique et diastolique reviennent à la normale à la suite du repos et de la médication sédatrice. La splanchnectomie n'influencera pas l'hypertension artérielle notablement, s'il y a ischémie rénale indépendante de l'influence nerveuse; mais l'hypertension artérielle de cause nerveuse, sera influencée favorablement par la résection splanchnique dans environ 70 pour cent des cas, et ces résultats seraient la conséquence de l'énervation des surrénales.

Toutefois, vu le petit nombre de cas longuement observés, on ne peut encore compter à coup sûr, sur une guérison définitive par la splanchnectomie.

D'après l'auteur ce problème chirurgical consiste à déterminer les cas où l'énervation rénospécialienne pratiquée au début de l'hypertension artérielle la fera choir à la normale, tout en provoquant une circulation rénale idoine. On connaîtrait ainsi le rôle initial du système nerveux dans la genèse de la maladie, de même que les autres facteurs à incriminer. Alors seulement on saurait pertinemment quels sont les cas relevant de la splanchnectomie.

PIERRE SMITH

#### Re-establishment of the Gastro-intestinal Passage after Gastric Resection. Poly, E.: *Surg., Gyn. & Obst.*, 1940, 70: 270.

Ce travail est un exposé de l'histoire, de la genèse, d'une terminologie révisée, des avantages et inconvénients, et des difficultés techniques des différents procédés de rétablissement du conduit gastro-intestinal après résection gastrique, surtout de la gastro-duodénostomie préconisée par l'auteur.

Pour le rétablissement du conduit gastro-intestinal la technique n'est pas tout. L'essentiel est la sécurité post-opératoire et le bien-être permanent de l'opéré. Il faut savoir les différentes méthodes pour choisir la meilleure dans chaque cas particulier ou exceptionnel.

L'auteur énumère les points essentiels des méthodes employées pour le rétablissement de la

continuité gastro-intestinale. Ces points sont à la base de la terminologie adéquate et nécessaire proposée par l'auteur, puisque 37 procédés différents peuvent être utilisés pour refaire le transit gastro-intestinal après résection gastrique sans compter les 12 procédés d'anastomoses complémentaires en Y.

La résection gastrique doit comprendre la résection partielle de l'estomac, avec le pylore et l'antrum ou au moins de toute la muqueuse du pylore et de l'antrum. Pour réaliser le rétrécissement et l'allongement combinés du bout gastrique restant il existe plusieurs procédés, motivés pour des raisons diverses. Le choix du meilleur procédé est difficile et implique la connaissance des dangers et des avantages de chaque procédé. Les dangers viennent de 3 facteurs que l'auteur commente en indiquant les moyens d'y remédier. Ces dangers sont: (1) les dimensions différentes des sections à coapter; (2) la traction anormale des tranches suturées; (3) les changements qui se produisent dans le passage du contenu gastrique après l'opération. Avantages: 2 principaux; la facilité opératoire et la fonction gastrique après chaque variété d'opération.

La facilité opératoire est en rapport avec la possibilité d'opérer en dehors de l'abdomen; d'où aseptie plus complète, meilleur contrôle des sutures, temps abrégé, moins de collapsus, de pneumonie ou autres complications. À cet égard la gastro-jéjunostomie est préférable à la gastro-duodénostomie. Mais la gastro-duodénostomie après gastrectomie, se rapproche le plus du fonctionnement physiologique normal et cause moins de troubles et de complications tardives que la gastro-jéjunostomie qui, elle, est plus facile et moins dangereuse.

Au nombre des difficultés techniques la principale est due à la fixité du duodénum. L'auteur préconise la résection gastrique tubulée ou conique qui facilite la suture gastro-duodénale termino-terminale quand l'état du duodénum le permet. Sinon l'auteur préfère l'anastomose gastro-jéjunale termino-latérale partielle inférieure rétro-colique. Parfois le choix ne s'impose qu'à ventre ouvert. L'auteur explique ensuite les avantages et des au nombre d'inconvénients éventuels de l'anastomose gastro-jéjunale termino-latérale rétro-colique, cite la constriction du moignon gastrique. Si on pratique la section gastrique oblique de gauche à droite et de haut en bas on enlève une plus grande étendue de la petite que de la grande courbure, ce qui est recommandable aussi bien pour le cancer que pour l'ulcère, vu que la lésion est plus étendue sur la petite courbure. D'autres points essentiels et de détails de technique sont expliqués par l'auteur de même que les avantages et les inconvénients de la gastro-duodénostomie termino-latérale, de la gastro-duodénostomie termino-terminale, de la gastro-jéjunostomie termino-latérale et de la gastro-jéjunostomie termino-latérale pré-colique.

PIERRE SMITH

## Obstetrics and Gynæcology

**The Nausea and Vomiting of Pregnancy due to Allergic Reaction.** Finch, J. W.: *Am. J. Obst. & Gyn.*, 1940, 40: 1029.

The nausea and vomiting accompanying pregnancy are due to an allergic reaction of the patient to the secretion of her own corpus luteum of pregnancy. The luteal hormone acting as an allergen is not progesterone, but is an unidentified hormone of the corpus luteum. Desensitization may be accomplished by injection of graduated doses of the hormone of the corpus luteum in oil, thus alleviating or stopping the patient's symptoms. Intradermal testing may determine, even before pregnancy, whether a patient will or will not be nauseated when pregnant by determining whether or not she is sensitive to her own secretion.

ROSS MITCHELL

**The Role of Deep Cauterization in the Prevention of Cancer of the Cervix.** Cashman, B. Z.: *Am. J. Obst. & Gyn.*, 1941, 41: 216.

Chronic cervicitis seems to be a contributing factor in the causation of carcinoma of the cervix. Cancer of the cervix is insidious in onset and because of the late stages in which it is seen today, prevention of cervicitis, prevention of cancer by adequate treatment of existing cervicitis, and early diagnosis by periodic examination of women over twenty-five years of age offer the best solution of the problem. In order to destroy infection in the cervix by cauterization it is often necessary to cauterize deeply and extensively. Careful post-operative care is necessary to prevent stenosis of the cervical canal after deep cauterization. Deep cauterization of the cervix has been an effective method of preventing cancer in a series of 10,000 cases, for only two cases of cancer of the cervix are known to have occurred in this series.

ROSS MITCHELL

**Tubo-uterine Implantation Followed by Successful Pregnancy.** Hayes, S.: *J. Obst. & Gyn. Brit. Emp.*, 1940, 47: 563.

A quartipara, aged 25 years, had been sterilized 4 years previously by section and ligation of the Fallopian tubes at the uterine ends. In December, 1937, implantation of the Fallopian tubes was performed, the technique of Bonney, slightly modified, being followed.

Two pieces of silkworm gut were threaded through the eye of a long probe and passed into the uterus. The cervix was clamped to prevent the probe slipping. The distal ends of silkworm gut were sutured to the vulva. The tubes were then about 1 inch shorter than normal. The uterus was incised transversely across the fundus until the uterine cavity was freely exposed and the lateral incisions were extended to the points where the interstitial

portions of the Fallopian tubes should normally be. The uterine ends of the tubes were split for  $\frac{1}{4}$  inch and a 0000 catgut suture passed through one lip only. This lip was then sutured to the uterus at the site which ensured that the tubes were lying in their normal positions. The uterus was closed with interrupted No. 1 catgut sutures, great care being taken that the tubes were not compressed. No clamps of any kind were used and hæmorrhage was negligible. Convalescence was uneventful. The two pieces of silkworm gut were withdrawn on the 8th day.

On February 1, 1938, inflation of the Fallopian tubes showed that both were patent. Hystero-salpingography confirmed this finding. One month later conception occurred, but ended in abortion.

On October 10, 1938, both tubes were patent on inflation.

In January, 1939, conception again occurred and a male child weighing 5 pounds 4 ounces was born naturally on October 10, 1939.

P. J. KEARNS

**The Cold Pressor Test in Pregnancy.** Browne, F. J.: *J. Obst. & Gyn. Brit. Emp.*, 1940, 47: 365.

The subject is placed in a recumbent position for 15 minutes; with the cuff placed on one arm, the opposite hand is placed in ice water at 4 to 5° C. The blood-pressure is taken at the end of 30 seconds and again at the end of 60 seconds. The hand is then removed from the bath and readings are taken every 2 minutes till the blood-pressure returns to its previous base level. The highest reading is recorded as a measure of the response. Normally the pressure returns to normal in 2 minutes after the hand is removed from the ice water.

The paper records the results of the cold pressor test in a series of 52 normal primigravida. The tests were undertaken in order to assess their value in picking out patients who might later develop pre-eclamptic toxæmia.

The peak of systolic pressure reached during the test seems to be of value in this respect. If the peak is over 150 mm. Hg. the patient is very likely, though not certain, to develop toxæmia later. A high range, i.e., the difference between the basal level and the peak did not seem to be of any value. The same applies to the time taken to return to the normal basal level. A high basal blood-pressure seems to be of value as an indication that toxæmia will develop later.

An early rise of blood-pressure, i.e., a systolic rise of 130 mm. Hg. or over at the first prenatal examination, is a useful and easily observed indication of an instability of blood-pressure of perhaps of a high basic level that is often a forerunner of pre-eclamptic toxæmia. In the present series it was as useful an indication as a high peak.

P. J. KEARNS

## Oto-rhino-laryngology

**New Tests and Clinical Experiments on Hearing.** Kobrak, F. W.: *J. Laryn. & Otol.*, 1940, 55: 405.

This paper is an analysis of some hearing tests used in diagnosis. A new tuning fork test is described. Using Struycken's tuning forks, which are calibrated according to the periods of hearing sensation, a series test is performed. The tuning fork is held to the ear until it ceases to be heard. This is timed and is called the primary period of hearing sensation. Then the fork is struck again and after a period of time equal to the primary period is brought to the ear until it ceases to be heard. This is called the secondary period. The procedure is repeated, the fork being brought to the ear after a time equal to the combined primary and secondary periods. This process is continued until the fork ceases to be heard and the last figure is called the final threshold. The times thus obtained are plotted as a graph and the author gives 90/20/0 in seconds as being normal for a c' fork. He believes that a long reading for the final threshold points to a middle ear or cochlear lesion, while a penultimate prolongation points to an active process in the sensory nerve itself.

An audiometer test to eliminate the present wide variations found in normal cases is suggested. A reading is taken when the patient first hears the tone as its intensity increases and a second reading when the patient fails to hear the tone as it is decreased. The double set of readings is plotted and the author believes that broad bands are produced by a middle-ear factor.

As a result of findings with these tests the author believes that for deciding on a suitable hearing aid a short audiometer test is sufficient, and for routine diagnosis a short test with reliable tuning forks is sufficient. The bone conduction audiogram is analyzed in detail, with a discussion of the relations of the action of the intrinsic aural muscles in hearing.

GUY H. FISK

## Radiology and Physiotherapy

**The Utility of Fluorography.** Hirsch, I. S.: *Radiology*, 1941, 36: 1.

Fluorography is photography of the x-ray image on a fluoroscope. The author discusses the points required of an efficient lens and states that he uses a commercial 35-mm. film camera equipped with an F 1.5 lens. A slower lens is not suited for this work and there is no faster lens ordinarily available which will cover this field.

The difficulties in controlling the lag of the fluorescent screen along with some experimental work on different types of screen are discussed. In general, the screens utilized today are those

which fluoresce blue and those which glow with a green light. In the former type the material used is an artificially crystallized zinc sulphide compound, while in the latter complex salts of heavy metals are utilized. A Patterson "B" screen and one of the zinc sulphide (fluorazure type) have both been used. The latter is most efficient though it has a certain amount of lag.

The apparatus consists essentially of a light-proof box of pyramidal shape with a fluoroscopic screen mounted at one end, a camera at the other, and means for adjusting the height of the apparatus. The camera is mounted at a distance of 90 cm. from the screen. The x-ray exposure required is about twelve times that used with the regular double-coated x-ray film and double high speed intensifying screens. For the average postero-anterior view of the chest 88 kv.p., 150 ma., and 1/10 second exposure at 80 cm. tube-screen distance is necessary.

Its value as a diagnostic agent for large numbers of x-rays of chests for tuberculosis and other diseases is conceded, and the low cost makes it possible to use this method in doing chest surveys of great numbers of the population.

R. C. BURR

**Roentgen Irradiation in the Treatment of Inflammations.** Pendergrass, E. P. and Hodes, P. J.: *Am. J. Roentgenol. & Radium Therapy*, 1941, 45: 74.

The value of irradiation in the treatment of inflammations has been well recognized by radiologists for years. The majority of other physicians, however, remain to be convinced of its therapeutic benefits. This healthy skepticism has been due largely to several factors: (1) A lack of well controlled experimental evidence supporting the value of irradiation; (2) the use of other therapeutic procedures in conjunction with irradiation which has prevented adequate analyses of the results attributed to irradiation; and (3) the concern with which doctors view therapeutic measures reported efficacious in a variety of conditions. Recent investigations have helped considerably to satisfy valid criticisms concerning the need for reliable experimental data. The second and third factors can be answered only by carefully evaluating one's personal experience and the data published by others.

The present communication is an attempt to analyze the results obtained in 527 patients treated for infections in the Department of Radiology of the Hospital of the University of Pennsylvania. Not all forms of inflammations have been treated by the authors; therefore, they have concerned themselves only with those inflammatory conditions with which they have had personal experience (bursitis, carbuncle, cellulitis, draining ears, erysipelas, erysipeloid, furuncle, gas gangrene, granuloma telangiectaticum, herpes simplex, parotitis, pneumonia, sinusitis, and verruca vulgaris).

The authors discuss the mechanism involved in irradiation of inflammations under: (a) Effect upon bacteria. (b) Effect upon normal cellular response to tissue irritants. (c) Effect upon normal immunological responses. (d) Effect upon vascular system.

The physical factors of techniques employed are outlined. Then follows a detailed discussion of diagnosis and treatment of bursitis, carbuncle, cellulitis and lymphangitis, temporal bone disease, erysipelas, erysipeloid, furuncle, gas gangrene, granuloma pyogenicum, herpes simplex, parotitis, pneumonia, sinusitis and verrucae.

R. G. BURR

### Anæsthesia

**Combined Intravenous-spinal Anæsthesia.** Kees, P. A.: *Current Researches in Anæst. & Anal.*, 1941, 20: 24.

The author has used novocain spinal anæsthesia combined with intravenous evipal or pentothal sodium, as the latter have very little effect upon the blood pressure. Evipal is favoured over pentothal as it is less depressing to respiration.

The use of intravenous anæsthesia in addition to spinal is indicated for premedication, for increasing anæsthetic depth, for quieting an excited patient during anæsthesia, and for prolonging anæsthesia. The solutions used are 10 per cent evipal or 5 per cent pentothal.

With evipal as premedication, the unco-operative patient may be placed in position for lumbar puncture and the spinal anæsthetic administered without his knowledge after a small dose of the 10 per cent evipal (3 to 5 c.c.) intravenously. Supplementary doses of evipal may be necessary after the spinal has been given due to insufficient depth. This may be administered through the intravenous tubing if the patient is already receiving an intravenous infusion of normal saline or 5 per cent glucose in saline. It is injected with a fine hypodermic needle directly into the tubing of the infusion apparatus. Evipal may be given in this way with the 5 per cent glucose in saline, but as pentothal forms a precipitate with glucose it is better given with normal saline solution or with blood transfusion if necessary. Small repeated doses of two to six c.c. are injected slowly until the patient is asleep. Then sleep may be maintained by giving one or two c.c. every ten to fifteen minutes as necessity demands. When a patient becomes excited during spinal anæsthesia he may be quieted by supplementary intravenous anæsthesia. This seldom requires more than one or two c.c. of the barbiturate solution to keep him dozing quietly.

When the operation must be prolonged beyond the limit of the spinal, anæsthesia may be extended with small doses of evipal or pentothal given intermittently. Here, as in the other cases cited, supplementary anæsthesia is for sensation alone. If the time required for opera-

tion outlasts the duration of motor relaxation pushing the barbiturate to the stage of relaxation may be dangerous and may cause too great a depression. Small doses of ethyl ether are probably the safest alternative method to obtain additional motor relaxation.

The use of intravenous-spinal anæsthesia is contra-indicated in patients with liver damage, in cases of shock and poor risks. When using combined intravenous and spinal anæsthesia the anæsthetist must be especially alert to any depressive changes in the patient's condition suggestive of overdosage, and treat these promptly as they occur with oxygen and carbon dioxide, and respiratory stimulants such as coramine, metrazol, alpha lobelin or picrotoxin injected intravenously.

F. ARTHUR H. WILKINSON

### Therapeutics

**Further Observations on the Clinical Use of Vitamin K.** Weir, J. F. *et al.*: *Am. J. Digest. Dis.*, 1940, 7: 485.

It is pointed out that the danger of post-operative hypoprothrombinæmia in severe degrees of cholecystic and biliary infection has not been generally appreciated. Hypoprothrombinæmia and the hæmorrhagic diathesis have been demonstrated in other gastro-intestinal conditions. Under the diseases outlined a deficiency diet, loss of essential substances by vomiting and diarrhœa, and an abnormal mucosal surface of the gastrointestinal tract are sufficient to deplete prothrombin. As in some cases of jaundice, the deficiency does not become serious until after some surgical procedure designed to correct the primary condition has been performed. The authors have used four synthetic compounds with excellent results, (1) phthiocol in doses of 25 to 50 mg. intravenously; (2) 1, 4-dihydroxy-2 methyl-3-naphthaldehyde in doses of 10 to 20 mg. intravenously; (3) 2-methyl-1, 4-naphthoquinone orally in doses of 1, 2, 3 and 5 mg. and (4) 2-methyl-1, 4-naphthohydroquinone-sodium sulphonate intravenously in doses equivalent to 2 mg. of 2-methyl-1, 4-naphthoquinone. They have also used vitamin K<sub>3</sub> (4-amino-2-methylnaphthol hydrochloride) intravenously with effect.

The treatment in other cases was of a prophylactic nature and no manifestations of bleeding were encountered at any time during the period of illness. The action of these compounds is extremely rapid and suggests a possible enzymatic activity.

S. R. TOWNSEND

**Hæmolysinæ Anæmia and Hepatic Degeneration Cured by Splenectomy.** Farrar, G. E., Jr., Burnett, W. E. and Steigman, A. J.: *Am. J. M. Sc.*, 1940, 200: 164.

The authors report the case of a 17 year old boy admitted to the Temple University Hospital because of jaundice and severe anæmia. He gave a history of two previous attacks of fever, leu-



coeytosis, and jaundice. There was no familial history of icterus.

The admission examination revealed moderate jaundice, a severe macrocytic type of anæmia, and an enlarged spleen. Transfusions caused aggravation of his symptoms and a reduction in his erythrocyte level to below the one million level, associated with intensification of the jaundice. Laboratory investigations showed that the blood serum contained hæmolysins not only for his own washed red cells but also for other red cells of donors in the same blood group.

As an emergency measure splenectomy was performed, following which there was a prompt reduction in his fever and general symptoms and a rapid rise in the erythrocyte level. Subsequent tests for hæmolysins were negative, although these were demonstrated in extracts from the excised spleen. Histological sections from the spleen showed marked reticulum hyperplasia, and from the liver, marked fatty degeneration. The patient made a complete recovery.

The authors conclude that the spleen not only was the site of production of hæmolysins causing the profound macrocytic anæmia, but was responsible for the marked hepatic degeneration. They suggest that all cases of atypical acholuric jaundice, particularly the adult acquired type, should be investigated for possible blood hæmolysins. Their discovery is an absolute contra-indication to transfusion and calls for prompt surgical removal of the spleen.

E. S. MILLS

### Pathology and Experimental Medicine

**The Relationship of Polyps of the Colon to Carcinoma.** Jackman, R. J.: *Proc. Staff Meet. Mayo Clinic*, 1941, 16: 11.

Il y a des cancers du colon qui ont pour origine des lésions polypoides de la muqueuse intestinale: c'est pourquoi ces proliférations doivent être enlevées. L'auteur rapporte un cas de polypes chez un malade opéré six ans après pour un cancer du recto-sigmoïde. Le processus de transformation et le temps requis pour la dégénérescence maligne d'un polype ne sont pas exactement connus. Le polype pédiculé ou le polype sessile est-il plus dangereux: question sans réponse actuellement. Il se peut que la grosseur du polype soit un facteur important, si l'on admet que le gros polype est à un stage plus avancé d'évolution.

La portion terminale de l'intestin étant le siège le plus fréquent de polyposé et d'adénocarcinome, n'y aurait-il pas entre les deux, un rapport de cause à effet.

L'histoire des malades porteurs de polypes intestinaux montre qu'ils meurent très fréquemment d'hémorragies ou de cancer colique.

La polyposé est une complication fréquente de la colite ulcéreuse, et la fréquence d'apparition du cancer chez des malades porteurs de

polypes secondaires à une colite ulcéreuse est frappante. Les études de Bargaen de la clinique Mayo ont bien démontré ce point.

Buie et Brust ont attiré l'attention sur le fait suivant: la coexistence fréquente du polype sur un intestin atteint de cancer, au point de le désigner sous le nom de "polype sentinelle".

En présence de ces faits, l'auteur conclut justement sur la nécessité d'enlever toute formation polypoïde du rectum et du sigmoïde, par l'électro-coagulation.

YVES CHAPUT

### Hygiene and Public Health

**Clinical Aspects of an Epidemic of Human Encephalomyelitis in Saskatchewan in 1938.** Garceau, U.: *Canad. Pub. Health J.*, 1941, 32: 1.

**Relation of Equine Encephalomyelitis to the Epidemic of Human Encephalitis in Saskatchewan in 1938.** Fulton, J. S.: *Ibid.*, 1941, 32: 6.

In the summer of 1938 an epidemic of equine encephalomyelitis broke out among the horse population of southern Saskatchewan. Some 15,000 horses are said to have been lost. From July 20th to September 12th of that year 29 cases of encephalomyelitis were reported in approximately the same area among the human population. These cases were characterized by abrupt onset, high temperature, severe headache and general malaise. The spinal fluid was found to be under pressure and to contain a small number of cells usually about 150 and principally lymphocytes. Four of the patients died and of the 25 who recovered 7 had residual symptoms, 2 of which later cleared up. Unfortunately by the time arrangements were made with the laboratory of the University of Saskatchewan for virus examination the epidemic was over and the sera of convalescent patients, which were submitted, were for one reason or another unsatisfactory for antibody titration.

Fulton reviews the literature on the relationship between equine encephalomyelitis and human encephalomyelitis which leaves little doubt that human beings are susceptible both to the eastern and western strains of equine encephalomyelitis. The question as to whether the Saskatchewan cases were actually infected by the equine strain remains unsettled, but the coincidence of the two epidemics is suggestive.

Consideration has been given to the method of transmission of this disease. The seasonal distribution is very much like that of poliomyelitis; that is to say, it is almost entirely limited to the summer months. An insect has been suggested as the vector, possibly the mosquito. At the time of the Saskatchewan outbreak mosquitoes were conspicuously absent. The stable fly, *Stomoxys calcitrans*, was however, particularly prevalent.

FRANK G. PEDLEY

## Obituaries

Sir Frederick Grant Banting, K.B.E., M.C., M.D., died in Newfoundland on February 21, 1941, as a result of a deplorable aeroplane accident, when on his way to England on a mission for the Canadian Government. It is not too much to say that owing to his brilliant work on insulin his was the most talked of name in medical science throughout the world. Canadian Medicine, and, indeed, Medicine generally, has lost one of its most distinguished figures. This issue contains a number of appreciations of Sir Frederick from some who knew him best. The character of the man can best be learned from these. The *Journal* wishes to be associated with those who have so well expressed our sense of loss. Its regret is genuine and deep.

### APPRECIATIONS

Sir Frederick Banting will go down in history as one of the world's great medical scientists, as a Nobel prize winner, and as the original mind and driving force behind the discovery of insulin. As Dr. Banting, he will be deeply mourned by thousands, humble and great, who in the most real sense owe their lives to him. His friends will remember Fred Banting as a generous, warm-hearted friend — a vigorous, original, indefatigable worker — a courageous, loyal soldier — and a versatile, modest, entertaining and charming companion.

As a member of the National Research Council for the past five years, Sir Frederick was a tower of strength. To him must go the credit for organizing and directing with outstanding success the Associate Committee on Medical Research. He also took the keenest interest in every phase of science and brought to the Council table not only a fund of information, a fertile and imaginative mind, but an irresistible enthusiasm that swept away difficulties and stimulated activities in all fields. His greatest interest since the outbreak of war lay in the field of aviation, and as Chairman of the Associate Committee on Aviation Medical Research he originated and planned investigations of far-reaching importance and had obtained practical results that have already been acknowledged in Britain and America. When the full effects of such studies are realized it will be apparent that Banting by his tireless energy and grasp of essential factors placed Canada in the forefront of yet another field of medical research.

The world will associate Sir Frederick's greatness with insulin. His friends and associates may well recall his work during the past 18 months with even

greater regard, for with characteristic singleness of purpose and determination he threw himself into the fight the day war broke out and his attention never strayed for a moment from the central objective of winning the war. With a complete disregard for personal comfort or safety, he spared himself nothing; he even seemed to court danger and asked no one to do anything involving risk which he did not first do himself. He gave up all the recreations he enjoyed and asked nothing in return. Finally, he has given life itself.

Fred Banting was a big man in every sense of the word. Modest and magnanimous, he never was self-seeking. Fame meant little to him and praise he did not desire. Material things he scorned; wealth he turned away; and never did he capitalize in any way on his discoveries, nor would he leave his native land, although many attractive and highly lucrative offers were made to him. He lived simply, spent little for his personal comfort, but gave freely and secretly to scores whose needs were great.

Although Sir Frederick's chief interest was research, he was prouder of his services in the last war as a front line battalion M.O. than of anything else, and his record there, with a well-earned Military Cross as evidence, justified his pride. He was an unusual composite: an idealist and a practical soldier; a country doctor, a distinguished medical scientist; an artist, but above all an explorer and adventurer in all fields of thought and action. He never lost his youthful curiosity; his mind was always fertile and stimulating. Above all he was a true patriot. He loved his country so well that when the call came in 1939 he put aside his plans for a more leisurely life at pure research, donned the King's uniform and threw

all his boundless energy into the struggle. He went on his last mission and to his death out of a stern sense of duty. After a life of simple greatness he died nobly. His memory lives on, an inspiration for those who still may serve.

C. J. MACKENZIE

(Acting President, National Research Council)

CABLEGRAM FROM GEN. McNAUGHTON

London, England,

26 February, 1941.

"We in the Canadian Corps have heard the sad news of Banting's death with the greatest regret which will be even deeper in the hearts of all ranks when they come to know the full significance of the work which he had undertaken on our behalf.

"Five years ago he joined the Council with the prestige of great accomplishment in the relief of the ills of suffering humanity. In all our work he gave of his best,



SIR FREDERICK BANTING



painstaking help in the administration of the Council's manifold activities, time freely devoted to other sciences as well as medicine, vision and insight and leadership, loyal co-operation and unfailing help and generous encouragement to those who laboured with him in the field of scientific research, modesty almost to a fault. He will be very greatly missed from his place at our council table. When the dark shadow of war overtook Canada and the Empire he came overseas with the desire for service again with the forces in the field but at my personal request he gave this up unselfishly to undertake the organization of research of far-reaching importance to us and which he alone could do. It is in the prosecution of this work that he has given his life. Already we have felt the benefit of his endeavours which will continue to bring comfort to us and confusion to our enemies."

used fetal tissue which was too old to contain merely islets, and as secretin-exhausted pancreas could not be free from enzymes, the use of acid and alcohol to reduce enzymatic activity must succeed, and did in the first case tried, but it was a struggle to produce active extracts regularly from beef pancreas. This step-like progress was not due to blind intuition, but to a sound and thorough knowledge of the literature of diabetes and a critical sifting of the facts from the doubtful. The thoroughness of his knowledge was not revealed to all with whom he was in contact and he was misjudged by some in consequence.

Of his subsequent intensive work on cancer little has been heard, because of his desire not to clutter the literature with unproved results, but I know that he showed the same cautious, thoughtful methods as with insulin.

His early struggle made him very anxious to aid young



This photograph was taken at Victoria, British Columbia, during the 1936 annual meeting of the Canadian Medical Association on the occasion of the presentation by Mrs. Starr of the Frederic Newton Gisborne Starr Award to Sir Frederick Banting, Dr. J. B. Collip and Dr. C. H. Best. This award was established by the Canadian Medical Association in memory of the illustrious surgeon, its former president, Dr. F. N. G. Starr, and is reserved as "the highest honour for the profession of Medicine in Canada, to be bestowed upon Canadian doctors who have, in the opinion of their confrères, outstandingly achieved in Science, Art or Literature, thus adding to the humanitarian or cultural life of our country".

*Left to right, Dr. J. B. Collip, Dr. C. H. Best, Mrs. F. N. G. Starr and Sir Frederick Banting.*

The untimely death of Fred Banting has removed a very remarkable character and is a great loss to medical research in Canada. My early association with him during the early days of the discovery of insulin was in the first instance due to the fact that he was worrying about the surgical problem of ileus, and as I was doing some experimental work on intestinal movements, he came up to my laboratory from Prof. McLeod's during his spare time. He naturally discussed his own work with me and this continued during the following year when he became a member of my Department.

I am consequently quite certain that the following ideas, which led to his great discovery, were his own. (1) The original idea of making extracts from the pancreas after atrophy of the cells secreting the digestive enzymes. (2) The emergency use of secretin-exhausted glands for the preparation of extracts. (3) The use of fetal glands in whom the ordinary glandular tissue does not develop as early as the islet tissue. (4) The beef pancreas. Banting argued that as he had

men with a desire for research, particularly if they had even crude ideas. Not only in his own laboratory but in aiding in the creation of the Banting Research Foundation, by whose grants nearly two hundred workers have profited, he did much to create facilities for medical research. If he erred at all, it was in giving young workers in his laboratory too free a hand, yet there is no need for me to speak of the many papers which appeared in the names of his colleagues.

He was a sincere Canadian. He was anxious to keep promising men in Canada, and this led to his later work with the National Research Council and its Advisory Medical and Aviation Committees. He took this work as a duty, much as he disliked it because it kept him from personal work. But again medical science in Canada owes him a very great debt.

Banting was generous to all his co-workers, ever giving the credit for all they did and more, but also a good friend, kindly and thoughtful, and will be missed by all who were associated with him. VELVET E. HENDERSON

The death of Sir Frederick Banting is a great shock to us here. When in the Department of Pathological Chemistry in Toronto I had the good fortune to get to know Dr. Banting well. He showed keen interest in my own work, especially on glutathione and ergothioneine in blood. But that was one of the secrets of Dr. Banting's influence—his capacity for being interested in the research work of others—especially that of young people. This same quality, combined with his constructive imagination and organizing ability, gained the confidence of all people who came in touch with him, and enabled him to become what Dean Mackenzie of the National Research Council has called the "Key-man in Medical Research for the Empire".

His interpretation of "medical research" was generous because he realized that all scientific research moves on one front. Yet he knew what he was about. His great motivation in life was to relieve human suffering, and although always sympathetic with so-called "pure science," he got visibly more enthusiastic as the problem approached the medical and human level.

Before he visited here towards the end of 1938 he desired to have some arrangements made for him to meet the medical students. He gave perhaps the most inspiring address they had ever listened to, on the subject of medical research. His other purpose here was to find out what facilities we had for research. That has also borne fruit in the shape of financial assistance which has aided in the training of certain young people and yielded a modest harvest of new and useful knowledge.

I think that there are as yet few people in Canada who realize the greatness of Frederick Banting. That will come when his biography is written. I feel sure there is solid material for something as great as Eve Curie has written for the discoverer of radium. Frederick Banting will be the Louis Pasteur of Canada.

GEORGE HUNTER,

*Department of Biochemistry,  
University of Alberta.*

Fred. Banting's loyalty to his Class, U.T. '17 M., was so intense that it is already legendary. Contrary to the usual occurrence, it did not reveal itself fully until after he had graduated and become famous. At College, he was quiet and self-effacing because of his shy and retiring disposition. His loyalty then was that of the average quiet hard-working student and not at all comparable to the almost fervent devotion to his Class which developed in the years of his great achievements. He was always deeply moved by a certain phrase in the Class song—"The best this side of Heaven". He never missed a Class dinner if he could possibly attend; and when he was elected to the Class presidency several years ago he said he appreciated that honour more than any other.

To him his Class was the natural repository for his faith and his confidences. He used it freely in times of stress and in times of triumph. Whenever Banting had achieved something unusual or was planning some important move we would be called together for a full and free discussion of his project. He insisted that these discussions be very frank and free, and he usually took the advice of the majority. It is no betrayal of confidence now to reveal that when he was offered his knighthood he demurred until he had thoroughly sounded out and weighed the opinions of his classmates.

The quiet, rich, kindly companionship that he gave to his Class was to be admired, and yet to be wondered at. The more he walked in high places, the richer and fuller became his friendship for his classmates, and the more he asked for and gratefully accepted their counsel. It was characteristic that he regarded any honour that came his way as an honour rather for his Class and his Alma Mater than for himself.

We, who were privileged to know this great man so well, regarded him as the living epitome of the heart of our Class; and now that he has been so ruthlessly torn from us our hearts are bruised and bleeding, but yet

hopeful that in the eternal comity of things someday the Great Healer Himself will permit a full re-union of the Class of 1917.

J. W. REDDICK

Dr. Oscar Lafayette Berdan, of Strathroy, Ont., medical health officer of Strathroy since 1909, veteran of the first Great War and active in military affairs, died suddenly on March 3, 1941.

Dr. Berdan was born in Longwood, Ont., in 1868, and had resided in Strathroy the last 52 years. He was a graduate of Trinity University (1889). He was lieutenant-colonel of the Middlesex Light Infantry for a number of years and carried that rank when he went overseas as medical officer of the 5th Divisional Ammunition Column in the last war.

Dr. Victor Bourgeault, of Wawota, Sask., aged 77, pioneer Western physician, died at Saskatoon on February 15, 1941. He came West in 1902.

He was stationed at the Duck Lake Indian reserve in Northern Saskatchewan for many years, accompanied the Royal Canadian Mounted Police in an expedition to the sub-Arctic, and in the Great War served in France and Serbia.

Dr. Bourgeault was a graduate of Victoria College, Cobourg (1888).

Dr. Edgar Browning, L.R.C.P., M.R.C.S., retired physician who practised for many years in Sherbrooke, Que., died in Montreal on February 5, 1941, in his 81st year. He had been in ill health since his retirement 12 years ago.

A native of Stamford, England, Dr. Browning graduated from Cambridge University and came to Canada in 1896. A few years afterward he began his practice in Sherbrooke.

#### AN APPRECIATION

With too great frequency, year after year, our medical profession witnesses the passing of its members who justly merit commemoration, and to whose memory we should dedicate a tribute of appreciation. But there are special persons who detain us more than others in reflection on past associations.

Such a man was Dr. Edgar Browning, who passed to his great reward last week. His was an academic career of a brilliancy given to few, associated with Oxford and Cambridge Universities in England, and subsequent teaching in Canada, followed by the practice of medicine.

His many years in Sherbrooke gave him a unique and enviable position in this community. A charm of personality was to his friends his greatest asset, and an urbanity and sympathetic understanding of human nature made him a solace and great comfort to his patients. There are few medical men of my acquaintance who were as ready at any time to sacrifice themselves to those in need as he. His generosity and hospitality were the priceless gifts of what he was—a perfect gentleman.

And so I pay tribute with gratitude for the privilege of an intimacy which one may cherish as being of the richest minds and finest associations given us in our chosen profession.

W. W. LYNCH

Dr. William E. Chambers, of Cleveland, O., formerly of Oakwood, Ont., where he practised for eight years, died early in January, 1941. Born in 1868, a native of England, he came to Lindsay, Ont., when a child and later moved to Toronto where he received his education. He was a graduate of the University of Toronto (1893).

Dr. William Alexander Cluff, of Saskatoon, Sask. Saskatoon lost one of its most colourful personalities in the death of Dr. William Alexander Cluff. His death on December 29, 1940, following immediately on that of his wife, shocked the community. He was not only a pioneer and pillar of the medical fraternity but was also widely known by a host of friends and patients throughout the province of Saskatchewan.

Doctor Cluff was born July 4, 1873, at Seaforth, in McKellop Township, Huron County, Ont., the son of David Cluff and Margaret Carduo. He spent his youth in Killarny, Man., where he was brought up on a farm. Later he taught school in the same district. He entered Manitoba Medical College and graduated in 1906. After an internship at St. Boniface Hospital he took up general practice at Strassbourg, Sask., for a short time. He next proceeded to New York to do post-graduate work in eye, ear, nose and throat. In 1909 he established himself in Saskatoon and continued in his specialty until the time of his death.

Alex Cluff was the second in his specialty to start practice in Saskatoon. His success was evident by his reputation throughout the northern part of the province. He held many offices in medical organizations. He was consultant in his specialty to the Saskatoon Tuberculosis Sanatorium, and Chief of the Department at St. Paul's Hospital, Saskatoon. At the Saskatoon Club he was a permanent fixture. His vacant place there remains as a monument to the affection in which he was held. He was a charter member of the Riverside Country Club. As an ardent golfer and charming companion on the course he was second to none. Alex Cluff had a keen mind, he loved the best books and was an omnivorous reader. By a strange coincidence several prominent Saskatoon business and professional men had been pupils of his in the little red school house on the farm when Alex was working his way through medical college. An everlasting friendship bound this circle together and some here still remain to grieve his loss.

Saskatoon mourns the loss of a prominent citizen; his numerous acquaintances feel the loss of a generous friend; and the medical profession will long remember him for his fraternal graces. One of his closest and dearest friends has best described the departed—"He was Lincolnesque in appearance, humour, heart and intellect".

D. M. BALTZAN

Dr. John Havelock Eastwood, of Peterborough, Ont., died February 17, 1941. He was born in 1864 and a graduate of the University of Toronto (1887).

Dr. Alfred Abram Farewell, of Harmony, Ont., died February 19, 1941. He was born in 1854 and held the diploma of L.F.P.S. (Glasgow) 1881.

Dr. Irvine John Leatherdale, of Jarvis, Ont., died on February 11, 1941. Dr. Leatherdale was born at Clearwater, Ont., a son of Mr. W. J. Leatherdale and the late Mrs. Leatherdale, in 1889. He graduated in 1915 (University of Western Ontario) and the following year went overseas with the Canadian Army Medical Corps. He was with the army of occupation in Germany, and returned to Canada in 1919. He established his practice at Jarvis in 1920.

Dr. Méderic Le Moyne, of Montreal, an eye and ear specialist, died suddenly on February 27, 1941, aged sixty-four. Born at St. Marc-sur-le-Richelieu, Que., he was educated at the University of Montreal (M.D., 1905), and studied in Paris from 1906 till 1910. He then began his practice in Montreal where he remained. A retiring man, much of his free time was spent in reading and studying.

Dr. William Fraser Mackay, of Port Washington, B.C., died in November, 1940. He was born in 1870 and a graduate of the University of Toronto (1900).

Dr. Hector McLean Paterson, of Rodney, Ont., died on February 22, 1941. He was born in 1871 and a graduate of the University of Toronto (1895).

Dr. Robert L. Shearer, of Edmonton, passed away on July 30, 1940, while on a visit to his old home in eastern Canada. He was 76 years of age. He was a McGill graduate (1901), and at first opened up an office in St. Chrysostome, Que. He practised there for several years, but in 1907 had the urge to come west and estab-

lished himself in the city of Edmonton. In the true sense of the word he was a family physician and endeared himself to his many patients.

Dr. George John Ainley Thompson, of London, Ont., died on February 16, 1941. Born in Carbonear, Newfoundland, in 1861, Dr. Thompson was a scion of one of the oldest and most prominent families of that island and a direct descendant of its early pioneers. He was one of the best educated men in this part of the country and was a brilliant student in his early days, graduating from the old Model School in Truro, N.S., and later from McGill University with the highest honours, winning many scholarships and the gold medals in final graduation.

He secured his Bachelor of Arts, Master of Arts, and Bachelor of Divinity degrees from McGill University, as well as an M.A. degree from the University of Chicago. After being in the Presbyterian ministry for some 15 years he finally moved to London in 1902 where for two years he was chaplain at Victoria Hospital. Still anxious for further educational accomplishments Dr. Thompson entered the University of Western Ontario as a medical student, at the age of 42 and graduated with his M.D. degree in 1906. For twenty years he conducted a successful medical practice in London.

Dr. Walter Scott Turnbull, of Vancouver, B.C., died in November, 1940. He was born in 1878 and a graduate of the University of Toronto (1903).

#### CORRIGENDUM

In the March issue of the *Journal* announcement was made of the death of Dr. James Franklin Adams, of Windsor, Ont. We have it on excellent authority, that of Dr. Adams himself, that the statement was incorrect and that he is very much alive. It seems that one of our usually reliable sources of information made an incorrect transcription from a daily newspaper. The item in question referred to Dr. James Franklin Adams, of Ann Arbor, Mich. We hasten to assure Dr. Adams, of Windsor, Ont., of our great satisfaction at his news and our regret if the false report has occasioned him any annoyance or harm.

## News Items

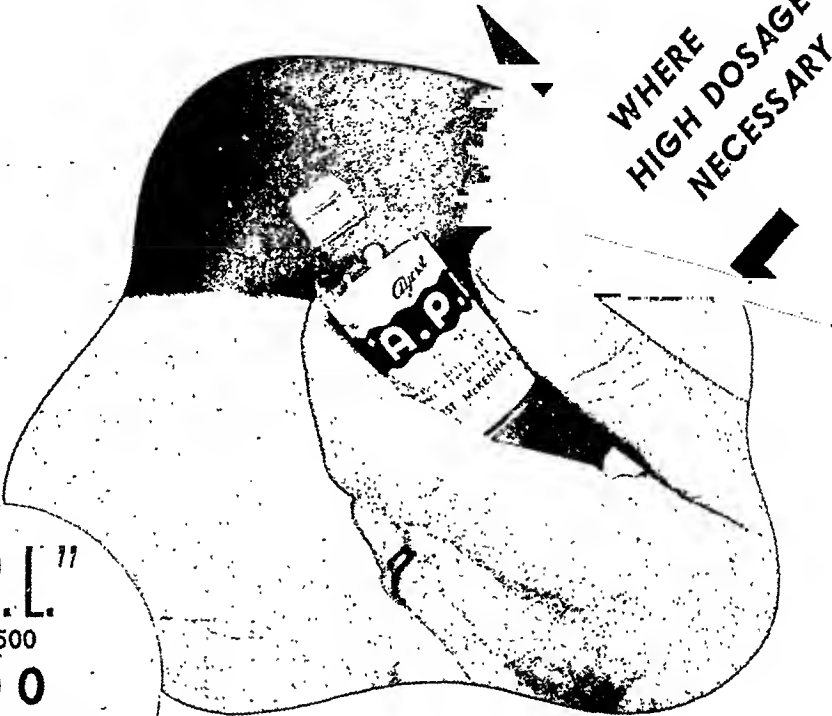
### Alberta

A plebiscite has been taken as to whether the Alberta Division of the Canadian Medical Association will abandon the idea of holding a September meeting, and, in its place, accept the invitation from the Manitoba Division to meet in Winnipeg at the time of the Canadian Medical Association meeting in June, 1941. While the final results are not yet known, a large number of the Alberta profession are planning to go to Winnipeg, yet the general feeling is that it would be a mistake to forego the Alberta Convention this fall.

As usual the University of Alberta, in collaboration with the Alberta Division of the Canadian Medical Association, is putting on a refresher course at the University in May next. The University, being quite democratic, has sent out a plebiscite. In this plebiscite over 100 subjects are listed to give the members of the profession an opportunity to state their preferences. These refresher courses are gradually growing in interest, many members of the profession not having missed a single course.

At the annual banquet held by the Calgary Medical Society, on February 11, 1941, a very interesting item on the program was the presentation to Dr. George A. Anderson of an illuminated address and a life-membership in the society. A graduate of Toronto University, he is now the member of the profession

# In Metrorrhagia and Impotence



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. . . painless on injection**

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who has the longest term of practice in Calgary of any of the one hundred men in this city.

When the Social Credit party came into power in 1935 the Government decided to reduce the number of commissioners on the Workmen's Compensation Board from three to one, all the old members retiring, and the new Commissioner appointed was Dr. Victor Wright. A recent Government announcement states that owing to the increased work of this Board it has been found necessary to appoint two additional commissioners. This has been done by the appointment of a representative of labour and a representative of industry.

The Cancer Committee of the Province of Alberta is starting a vigorous campaign of cancer education and contemplates a page article in the *Alberta Medical Bulletin* every issue.

The Council of the College of Physicians and Surgeons of the Province of Alberta is frequently appealed to for registration of European refugees, but, as it is almost impossible to get satisfactory reports on the applicant's character and ethics, to safeguard the interests of the public the Council is restricting its registration to British subjects or graduates of Canadian and British universities.

Dr. A. Cherry, who was recently elected a representative on the Council for District No. 2, Lethbridge, has joined the R.C.A.M.C., and has left the province. Consequently there will have to be a new election in that district.

Operation of the Calgary General and Isolation Hospitals will result in an estimated charge to the mill rate of \$90,089.57. Total expenses for the hospitals during the current year were estimated at \$354,788.48, an increase of \$56,199.27 over the actual expenses of 1940. The increase in the estimated expenditures is largely due to the opening of a new wing. The estimated revenue is \$225,198.91. This is greater by almost \$10,000 than the estimated revenue for last year. Indigent patients last year cost the city \$60,000, so an estimate of \$57,500 was allowed for the current year.

According to Dr. W. H. Hill, Calgary's Health Officer, cancer was the second chief cause of death in this city. There were 152 deaths from this cause out of a total of 885 deaths, an increase of 39 over last year. Violence and accidents accounted for the deaths of 45 persons last year, an increase of 4 over the year 1939. There was a slight decrease in the number of deaths from pneumonia, tuberculosis, diabetes and influenza. Diseases of the heart, arteries and kidneys caused 320 deaths, a decrease of 27 from the previous year.

Dr. G. M. Little, Medical Health Officer of Edmonton, reported the total of communicable diseases cases in 1940 was 5,946 as compared with 2,818 in 1939. Measles accounted for 2,994 of the 1940 total, and chickenpox 1,634 as compared with 608 in 1939.

G. E. LEARMONTH

### British Columbia

Vancouver was honoured recently by a visit from Dr. Hendrik Dam, of the University of Copenhagen, discoverer of vitamin K. Doctor Dam gave an address to the Vancouver Medical Association on the subject, and one could not but be impressed with the tremendous amount of work and research of which the actual discovery of the vitamin was merely the last step. Doctor Dam is a chemist of very high standing, and he gave a fascinating turn to what in less dexterous hands might have been a dry and difficult subject to understand, for those who do not know much chemistry. His is the imaginative and deductive type of mind which leads to discovery.

The Osler Lecture of the Vancouver Medical Association, an annual feature of the year's activities, will be given this year by Dr. G. F. Strong, of Vancouver. His subject is not yet announced, but it will deal with the modern conceptions of cardiac disorders, and their treatment. It will be given on March 12th, in the Hotel Georgia.

In July, 1940, the *Bulletin* reported the preliminary stages of work that has been done by Dr. F. N. Robertson, of Vancouver, on a test for the presence of carcinoma in any given patient. Doctor Robertson has made his second report, which appears in the *Bulletin* shortly—and which shows considerable progress. He reports results on 134 cases, and an improved and simplified technique. It is much too soon yet, of course, to say anything definite, but the results seem to be remarkably constant, and show a very high degree of accuracy. Failures are recorded faithfully and analyzed carefully. The test is still in its early stages, but it would appear that there is here a very important avenue that should be explored thoroughly.

Dr. F. M. Auld, of Nelson, Past-president of the British Columbia Medical Association, went east lately to attend the meeting of the Executive Committee of the Canadian Medical Association in Ottawa, March 14th and 15th.

Lieut.-Col. Gordon C. Kenning has returned to Victoria from Regina, to assume the duties of D.M.O., M.D. No. 11. Lieut.-Col. R. A. Hughes, formerly D.M.O. here, is going to Regina to take Colonel Kenning's place.

The election for membership to the Council of the College of Physicians and Surgeons is now under way. There are contests only in District No. 1 where Victoria is the centre, and District No. 3, where Vancouver, with five candidates, is the centre. Elections take place early in April, ballots being counted on April 7th.

J. H. MACDERMOT

### Manitoba

A by-law to authorize the council of the rural municipality of Edward, Manitoba, to engage a municipal doctor will be voted upon March 26th. If approved there will be an annual levy not exceeding two mills on the assessed value of all rateable property in the municipality for the purpose of paying the physician's salary.

The by-law proposes also to charge each family \$5 a year and single persons \$3 a year. The receipts from this source would be applied on lowering the amount to be paid on any levy rate decided by the council.

Should it become necessary to make a levy exceeding one mill, authority is asked to impose a minimum doctor's tax of \$4 on each property owner.

Dr. Hendrik Dam, of Copenhagen, discoverer of vitamin K, delivered the Gordon Bell Memorial Lecture on February 26th in the University of Manitoba. The idea of the new vitamin had come to him after experiments on chicks. The vitamin can be recovered from grains, especially alfalfa, and from products of protein digestion. It is found in the faeces. The natural vitamin is fat-soluble. It acts by restoring the natural level of the blood prothrombin. More recently the substance has been prepared synthetically and the synthetic product is found more potent than that prepared from natural sources.

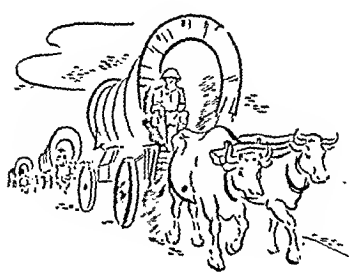
Dr. Digby Wheeler, President of the Winnipeg Medical Society, was in the chair. Dr. F. G. McGuinness moved a vote of thanks to Dr. Dam on behalf of the large audience present.

Dr. L. G. Bell addressed the Scientific Club of Winnipeg on March 11th. His subject was "Pain as a symptom".

ROSS MITCHELL

# SEEKING NEW FRONTIERS

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The four walls of the laboratory do not a prison make for the vision of the inspired worker in search for new frontiers in medical progress. From his retorts and crucibles issue new ways and hitherto unknown measures for the alleviation of disease and for its prevention. To the earnest search for new and improved medicinal substances the Warner Institute for Therapeutic Research is dedicated. The results of its exploration in the field of purely scientific research are presented in the reports published from time to time. To make available its discoveries in therapeutic products to the physician and pharmacist, is the privilege of William R. Warner & Co., Inc., a world-wide organization, with laboratories and agencies in 75 countries.



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### New Brunswick

Dr. R. O. B. Monohan has established a practice in the specialty of eye, ear, nose and throat diseases in Saint John. He will be associated with Dr. R. T. Hayes.

Major W. O. McDonald and Dr. S. H. Calnek, both staff physicians of Saint John General Hospital, have joined the active service in the Royal Canadian Army Medical Corps.

The Local Public Health Authorities have reported an unusual number of cases of measles in recent months as well as sporadic cases of spinal meningitis. The epidemics are apparently on the wane.

Dr. A. S. Kirkland, Radiologist of the Saint John General Hospital, has been elected a member of the American College of Radiology.

Lt.-Col. G. A. Lyons, R.C.A.M.C., has been appointed temporary Commanding Officer of Camp Hospital, at Sussex, N.B.

The Military Gazette authorizes promotion to Captaincy, for Lieutenants H. P. Melanson, H. M. McLean, J. A. Melanson, A. L. Richards, R. B. Eaton, R. D. Landry, all members of No. 14 Field Ambulance, Active Army.

Dr. W. J. Baxter, Fairville, N.B., is again confined to hospital. A. STANLEY KIRKLAND

### Nova Scotia

New cases of diphtheria in Halifax are confined, in the great part, to pre-school children and adults. This is tangible evidence of the efficacy of the toxoiding done amongst the school children when the disease first appeared in November.

Hubbards and the south end of Halifax county almost had a doctor. He was on his way, when he paused at Halifax and, hearing another call, joined the army.

Showing a practical, extra-professional interest in the welfare of their communities are Dr. C. F. Messenger, recently declared mayor of Middleton, and Dr. J. W. T. Patton, secretary-treasurer of the Truro Board of Trade.

Dr. Roderick Cameron has moved to Musquodoboit Valley, taking over the practice of Dr. C. H. L. Baker.

Dr. J. Howard Mueller, of Harvard, addressed the Health Division of the Halifax Social Service Agencies on "Environment affected by war and the influence on infectious diseases and epidemics".

ARTHUR L. MURPHY

### Ontario

Arrangements are almost completed for the annual meeting of the Ontario Division of the Canadian Medical Association. The meeting will be held at Windsor, Ont., May 26th to 30th. Outstanding speakers, fine exhibits, interesting discussions on medical economics, and excellent entertainment are the main features. Reservations at the Prince Edward Hotel should be made early.

Major-General E. C. Ashton, C.B., C.M.G., who, since giving up his practice at Brantford at the outbreak of war in 1914, has been attached to the permanent

services, has been gazetted Lieutenant-General. Dr. Ashton had a brilliant career in the Canadian militia as an infantry officer, and went overseas in 1914 with the artillery. At the close of the war, having been thrice mentioned in despatches, he became Adjutant-General for Canada. Since then he has commanded various military districts and has held most of the important posts at militia headquarters. His many friends will be pleased to know of his promotion in recognition of his long and efficient service to his country.

Dr. N. C. Delarue, of Toronto, has been presented with the medal of the National Safety Council for his heroic resuscitation of Dr. F. B. Thomson when both were struck with lightning in Algonquin Park last summer. The presentation was made in the Lecture Room of the Toronto General Hospital before staff doctors and interns.

A thirty-nine year old, German-born, physician, who was befriended on his arrival in Canada, was sentenced last month to serve nine months definite and one month indefinite in the Ontario Reformatory on four charges of forging and dealing in narcotic prescriptions, to which he pleaded guilty.

Dr. J. H. Holbrook, of the Mountain Sanatorium, Hamilton, announces that the Hamilton death rate from tuberculosis during 1940 reached the low of 16 per 100,000 population—a goal which had not been anticipated for another ten years. Since the founding of the Mountain Sanatorium and the development of anti-tuberculosis work in and about the city the death rate has rapidly fallen. Four years ago, it was 23.7 per 100,000; in 1913 it was 121 per 100,000.

J. H. ELLIOTT

### Quebec

Le Dr Henri Laugier, directeur du Centre de recherche scientifique de France a été nommé professeur titulaire de physiologie à la Faculté de Médecine et à la Faculté des Sciences de l'Université de Montréal. Le nouveau titulaire a été engagé pour deux ans.

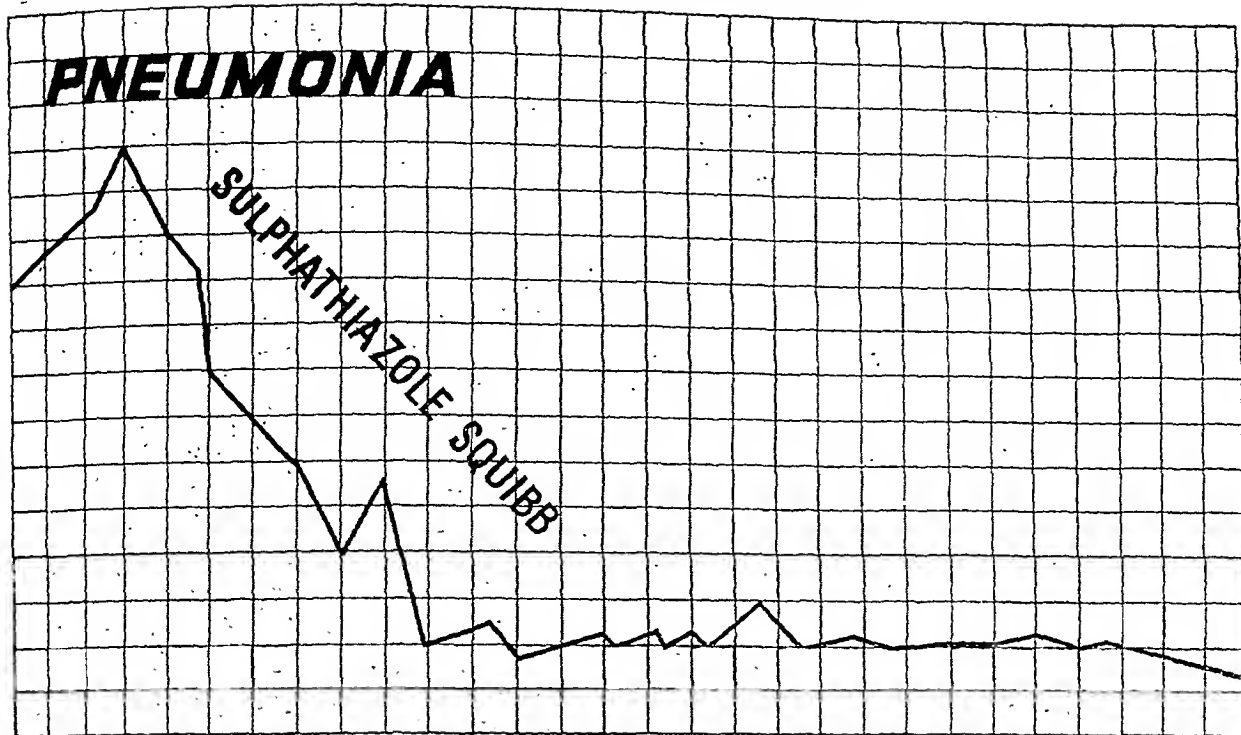
Le Ministère provincial de la Santé et du Bien-Etre Social donne les conseils suivants pour la dépense quotidienne d'un dollar destiné à l'alimentation: 20 cents pour le lait et le fromage; 20 cents pour les fruits et les légumes; 20 cents pour la viande, les œufs et le poisson; 20 cents pour le pain et les céréales; 20 cents pour les aliments sucrés, le beurre et les autres substances grasses.

Le Major L. M. Emard, ancien surintendant médical de l'hôpital Notre-Dame, a été nommé directeur des services médicaux du district no 3 pour l'entraînement des aviateurs. Ce district comprend le Québec, le N.B., l'île du P.E., et une partie de la N.E. et de l'Ontario.

L'hôpital du Sacré-Cœur, Cartierville, a élu pour 1941 le Bureau Médical suivant: *Président*, J. E. Samson; *Vice-président*, J. A. Vidal; *Secrétaire-Trésorier*, J. P. Paquette.

Le doyen de la Faculté de médecine de l'U. de Montréal annonce une séance publique pour honorer la mémoire de Sir Frédéric Banting. Le Professeur Laugier sera le conférencier.

Dans son allocution de nouveau président de la Société médicale de Montréal, le Dr. Hector Sanche faisait les remarques suivantes au sujet des "Journées médicales": "Nos Journées médicales d'octobre dernier ont été intéressantes et appréciées. L'automne prochain nous recommencerons et nous espérons que ces Journées deviendront traditionnelles. Trop de profit nous arrive à tous par ces séances cliniques pour que nous les laissions jamais tomber."

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**FOR CONVALESCENCE**

*Navitol Malt Compound* 2 tsp. T.I.D.

**SULPHATHIAZOLE SQUIBB**

The Thiazole Analogue of Sulphapyradine chief advantages appear to be:

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| (1) Less tendency to cause serious nausea or provoke vomiting. | (3) Less conjugation after absorption.       |
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La séance du 4 mars dernier de la Société médicale de Montréal a été consacrée à l'étude du cancer. MM J. E. Gendreau, O. Dufresne, L. Jutras, G. Pinsonneault, J. N. Roy, N. Allaire, V. Latraverse, L. P. Laporte, P. Caumartin, E. P. Grenier et R. Roux y ont fait le symposium de la lutte anticancéreuse et des aspects variés des cancers de la peau, de la bouche, du poulmon, de l'utérus et du rectum. JEAN SAUCIER

### Saskatchewan

At the regular meeting of the Regina and District Medical Society held on February 21st Major Harold Spooner, of the Eighth Base Hospital, formerly of Regina, was the guest speaker. He gave a paper on "War injuries".

Dr. W. A. Dakin, chairman of the committee on Economics, has notified doctors in Saskatchewan cities that there will be no relief grant for any of the country cases treated in the city during the 1940-41 relief year.

Dr. George H. Lee, formerly of Prince Albert, has an office in the Medical Dental Building, Vancouver, B.C. LILLIAN A. CHASE

### General

#### THE BANTING RESEARCH FOUNDATION

The annual report of the Honorary Secretaries of the Banting Research Foundation for the year 1939-40 discloses that its income was distributed in two ways. A block grant of slightly less than one-half its income was made to the Banting and Best Chair of Medical Research of the University of Toronto and eighteen individual grants were made to research workers in various parts of Canada who submitted problems to the Foundation which were approved by the Trustees. Summarized reports of the results obtained on these eighteen individual grants follow.

Four grants were made for studies on chemotherapy. On one, Dr. W. J. Auger, Hospital for Sick Children, Toronto, found that sulfapyridine, and sulfapyridine plus Type I antipneumococcal rabbit serum caused a marked reduction in the incidence of empyema in Type I pneumonia. He also devised a plate method for determining the relative potencies of various chemotherapeutic agents against pneumococci. He also found that novocaine in body fluids has a powerful antichemotherapeutic effect.

An assistant was provided for Dr. P. H. Greey, University of Toronto, to enable him to test some seventy sulfanilamide compounds synthesized in the Department of Medical Research, University of Toronto, as to their therapeutic effects in combating staphylococci. Some gave promising results in the test-tube but failed to protect animals against staphylococcus infection.

Dr. W. Hurst Brown received a grant to allow x-ray studies to be made on a large group of patients who had previously received large doses of sulfapyridine, in order to see whether any of them had developed urinary calculi owing to the deposition of the acetylated sulfapyridine. As only two out of 30 patients had any suspicious findings, the danger of calculi formation in properly handled patients does not seem great.

Dr. Karl Sternbach, University of Toronto, tested the chemotherapeutic effects of many new organic compounds on meningococci and gonococci. Seven new drugs tested were found to be as potent as sulfanilamide in combating meningococci in mice and some of these were less toxic than sulfanilamide.

Five grants were made for various researches on hormones. Mr. M. M. Hoffman, Dalhousie University, with Dr. Heard, isolated a hitherto undescribed member of the female sex hormone series in equine pregnancy urine. Mr. A. F. McKay in the same Department discovered a previously undescribed isomer of the male sex hormone. Dr. A. W. Ham, University of Toronto, is

investigating the effect of anterior pituitary extracts on bone repair. Extracts containing the growth principle were not observed to have any stimulating effect on the repair of fractures in young animals. Their effects on repair in older animals, and the effect of hypophysectomy on bone repair are still under investigation.

Dr. P. G. Weil, Royal Victoria Hospital, Montreal, continued studies on the relation of the cortical hormone to shock. With Dr. Rose it was found that giving desoxycorticosterone and adrenal cortical extract together significantly reduced the mortality from experimentally produced surgical shock.

Mr. H. C. Read, Dalhousie University, performed experiments in the hope of clarifying the respective rôles of the testes and the adrenal in maintaining prostatic and seminal vesicle structure. The results are now being studied.

Two grants were made for research on vitamins. Dr. D. G. H. MacDonald, University of Toronto, found that supplying fat did not prevent the slow heart rate that develops in vitamin B deficiency, although fat will prevent or cure other manifestations of B deficiency. Thiamin was found to be the only pure substance which affects the heart rate. A liver factor is also concerned in the slow heart-rate observed in B deficient diets. Thiamin was found not to affect the tone of the large intestine, but evidence was obtained of some unidentified member of the B complex altering bowel tone. The thiochrome procedure for the assay of thiamin was found accurate for pure solutions, but unsatisfactory for the measurement of thiamin in urine. Miss H. M. Perry, University of Toronto, investigated vitamin C and P deficiency with regard to hemorrhages. In guinea pigs vitamin C prevented hemorrhages, but vitamin P did not. Evidence was found that vitamin C is not the only factor needed to prevent capillary hemorrhages in man; hence estimation of vitamin C needs or deficiency should not be based on tests depending on the strength of capillary walls.

Seven other grants for various other researches were also made. Dr. Edith Anderson, University of Toronto, prepared and investigated the physiological actions of L-sugars. There was reason to hope that these might inhibit the anaerobic fermentation of cancer cells but, on testing, L-sugars proved to be inert biologically.

Dr. K. C. Fisher, University of Toronto, investigated the relation of anesthesia to cell anoxemia. It has appeared from the effects of ethyl carbamate that it is possible to divide the normal oxygen consumption into two fractions which presumably represent two separate enzyme systems. These are depressed by different concentrations of narcotics. This finding removes certain objections to the hypothesis that narcosis is due to an inhibition of oxygen consumption.

Miss E. G. Huntsman, University of Toronto, received a summer grant to study the cause of hyaline degeneration of arteries in experimental hypertension. A new method for estimating blood pressure which depends on the observance of colour change in the tail was devised for use in young rats. Hyaline degeneration of arteries was found to develop as soon as the seventeenth day. The work is still in progress.

Dr. E. E. Kuitunen continued her studies on the incidence and types of intestinal parasites in Toronto. Twenty-eight per cent of 324 patients in the Toronto Western Hospital were found to harbour some species of protozoa or helminth. Fresh pineapple juice was found *in vitro* to be an effective anti-helminth, but in the presence of gastric juice of 0.2 per cent HCl, on administration to two cases, it was ineffective. Three hundred diaphragms from autopsies at the Toronto General Hospital and the Hospital for Sick Children were examined for *Trichinella spiralis*. Seven positive results were found; all of these unrecognized clinically. Drs. T. F. Nicholson and D. L. Selby, University of Toronto, found on causing degeneration of the distal tubule of the kidney by uric acid that no decrease in the clearance of inulin, creatine or urea resulted, but that the ability of the kidney to reabsorb water and salt was impaired more markedly than when the proximal tubule

## In Obstetrical and Surgical Practice

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*Pituitary Extract (posterior lobe)*, an aqueous preparation derived from the separated posterior lobe of the pituitary gland, holds a well-recognized place in materia medica.

In response to requests of physicians and hospitals the Connaught Laboratories have made available a preparation of Pituitary Extract (posterior lobe). This preparation is a highly stable extract, biologically standardized to contain ten International units per cc. It is supplied in packages of five 1-cc. vials having rubber stoppers which make possible the aseptic withdrawal of individual doses without contaminating extract left in the vials for later use. Information relating to Pituitary Extract (posterior lobe) will be supplied gladly upon request.

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Canada

was damaged. Experiments on the effect of sulfanilamide on the kidney showed that no damage was produced when concentrated solutions were injected directly into the renal artery.

Dr. Bram Rose, Royal Victoria Hospital, Montreal, found after experimental surgical shock that there was a decrease in the blood histamine and an increase in plasma histamine. After anaphylactic shock in the rabbit a rapid and marked decrease in the histamine content of blood and plasma occurred. A decrease in the blood histamine has been found in human cases of acute angio-neurotic oedema. Dr. E. G. Young, with Miss H. P. Wentworth, Dalhousie University, worked out a method for the assay of allantoin in blood in which the Rimini-Schryver reaction for allantoin was applied to its colorimetric estimation. This method allows the estimation of allantoin in 5 ml. of blood with a probable accuracy of 10 per cent, using an ordinary colorimeter.

V. E. HENDERSON,  
A. W. HAM,

*Honorary Secretaries.*

## Book Reviews

**The Parasites of Man in Temperate Climates.** T. W. M. Cameron. 182 pp., illust. \$3.00. University of Toronto Press, 1940.

The need for this little book is stated succinctly in the preface: "Parasites are not confined to the tropics; many are common in temperate and sub-tropical climates as well, while some are actually confined to the temperate zone . . . Moreover, we no longer measure the distance from the equator in miles, but in hours; increasing numbers of persons visit the tropics yearly, and the medical man of north temperate climates can no longer afford to be wholly ignorant of diseases outside of his immediate zone of interest." The book is based on the course of animal parasitology given to McGill medical students, and is intended for physicians practising in temperate and sub-tropical zones, rather than for the specialist in parasitology. Particular attention is given to parasites which occur in North America and in Great Britain.

Three large sections deal respectively with protozoa, helminths and arthropods, a shorter section with leeches, and finally there is a short section on the technique of procedures designed "to enable a medical practitioner to diagnose the parasite and to prepare specimens to be sent to a laboratory for identification." The book is excellently illustrated throughout with valuable diagrams of life-cycles, diagrams for differential diagnosis, photographs and photomicrographs. Treatment of infected patients is dealt with, as is also the preventive treatment of food, in connection with which numerous comments of which the following is illustrative are practical and illuminative: "The high incidence of sub-clinical trichinosis . . . is probably traceable to cooked pork. In spite of our belief that the Anglo-Saxon peoples overcook pork, there is no doubt that it is often not cooked sufficiently to destroy the encysted parasites." The book "reads" very easily.

**A Guide to Human Parasitology.** D. B. Blacklock and T. Southwell. 4th ed., 259 pp., illust. 12s. 6d. H. K. Lewis, London, 1940.

The fourth edition of this text has recently appeared. The text was written, as our readers may recall, for students in tropical medicine at Liverpool University, to accompany and to epitomize the lectures in parasitology there. Few alterations have been made in this edition, and in its essentials it remains unchanged. It will prove of value to those who may have occasion to diagnose tropical parasites and who do not wish to purchase more expensive texts.

**Clinical Urology.** O. S. Lowsley and T. J. Kirwin, with drawings by W. P. Didusch. 2 vols., 1684 pp., illust. \$10.00. Williams & Wilkins, Baltimore, 1940.

It is quite probable that there are enough textbooks on urology. None the less, a new book on urology is usually opened with an eager expectancy, which in this particular case has been amply rewarded. The authors of these most attractive volumes should be well known to your readers, as having published a textbook on urology in 1926. It is no discredit to them or their earlier work to say that these volumes represent a definite improvement over the earlier one. While this may be due to the increasing skill and experience of the authors, and other considerations, the generous supply of excellent illustrations by the talented medical artist Mr. Didusch has greatly contributed to this happy result.

As the title suggests, the work is written from the clinical point of view, and, as the authors admit, with special reference to the surgical aspect of urology. None the less, the authors have not neglected the purely scientific considerations so necessary to a proper understanding of their clinical aspects. Your reviewer cannot forbear from again drawing attention to the lucid and revealing illustrations which the authors have selected so generously. In fact, it is this feature that has given to these volumes their special character and value.

The two volumes are most attractive. They are satisfactorily solid, being printed on good heavy paper. One feature is much appreciated by your reviewer; an adequate and well chosen bibliography is appended to each chapter. This adds very greatly to the convenience of the reader.

This work ranks easily with outstanding urological publications of recent years, and can be recommended to all who are interested in urology, both teachers and students.

**Medical Diseases of War.** A. Hurst. 326 pp., illust. \$4.75. Macmillan, Toronto, 1940.

During the War of 1914 to 1918 Sir Arthur Hurst was the author of a book entitled "Medical Diseases of the War." Two editions were published—the first in November, 1916 and the second in March, 1918. By the end of 1918 he had collected material for a third edition, but the armistice made its publication unnecessary. The present volume, entitled "Medical Diseases of War" may be regarded as the third edition of this work, brought up to date in the light of knowledge acquired since 1918.

Almost one-half of the book is devoted to neurological disorders with special attention to various types of hysterical symptoms. Other chapters deal with trench fever, typhoid and paratyphoid fevers, bacillary dysentery, epidemic jaundice, tetanus, nephritis, soldier's heart, gas poisoning, scabies, pediculosis and the seborrhoeic state. It will be noted that the author has made no attempt to cover all the medical diseases likely to be met with in war. For example, the list of subjects does not include pneumonia, cerebrospinal meningitis and the common contagious diseases as well as many of the conditions which would probably be encountered in an Eastern campaign. The possible prophylactic and therapeutic value of sulfanilamide and related compounds in time of war is not discussed.

The ability of the author to draw on his extensive experiences in the last Great War makes the book of special value. All physicians, including those engaged in civilian practice, should find much of interest in it. It will prove extremely helpful to officers of General Hospital Units, regimental medical officers and others who are in daily contact with medical diseases prevalent under war-time conditions.

**Strange Malady.** W. T. Vaughan. 268 pp. \$3.00. Doubleday, Doran, New York, 1941.

A more or less popular version of the allergic problem by one well qualified to write it.

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(Trade Name)

**Sugar Coated Orange Tablets**

Each tablet contains:

Vitamin A	- - -	10,000 U.S.P. Units
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**INDICATIONS.**—As a supplement to the daily diet for the prevention of dietary deficiencies of these vitamins as in prolonged illness, convalescence, adolescence, restricted diet, pregnancy, lactation and defective absorption.

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Ethical Pharmaceutical Products.

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caused by head, body or crab lice cleared  
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*Cuprex destroys the nits as well  
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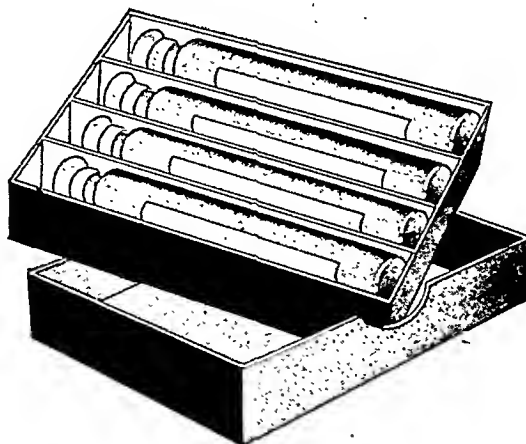
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## NEW SUCCESS IN TREATMENT

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The clinical data obtained in our Allergy Laboratory from many hundreds of referred cases, including those with obscure etiology is at your disposal. Our Allergy Service is most complete and you are welcome to correspond with us on your individual problems.

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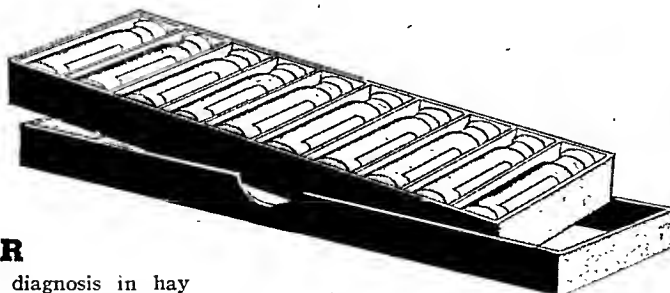
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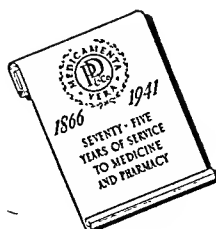
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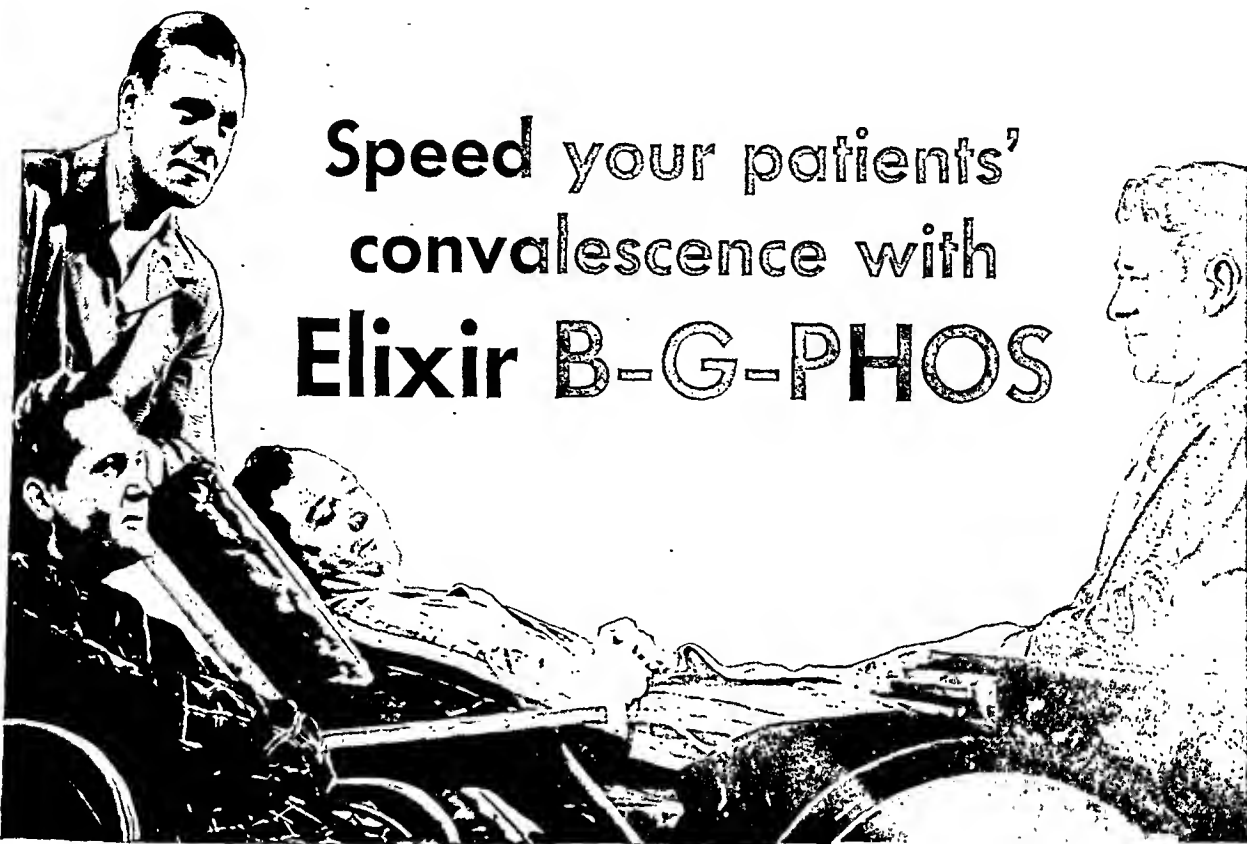
# THESE NAMES, THESE YEARS HAVE HELPED MAKE MODERN MEDICAL HISTORY

One of a series of advertisements  
commemorating three quarters of a  
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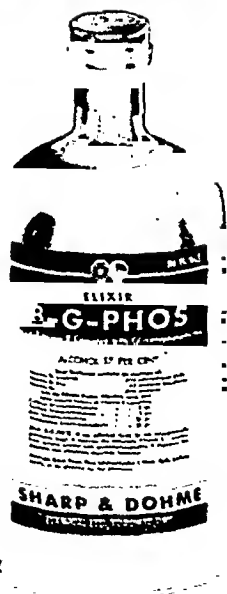
1877 Koch investigates the causes of traumatic  
infections.  
Pasteur discovers the bacillus of malignant  
edema.  
Parke, Davis & Company sends expeditions  
to study the medicinal flora of the West  
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and South America; introduces Cascara  
Sagrada to the medical profession.



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PIONEERS IN RESEARCH ON MEDICINAL PRODUCTS



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THE ROLE OF VITAMINS in the maintenance of health and the prevention of disease finds no better illustration than in the Vitamin B-complex. New indications are constantly being found, and heretofore unidentified factors are rapidly being isolated and their specific indications determined.

Clinical and laboratory reports indicate that the whole Vitamin B-complex from natural sources is superior therapeutically to any single fraction.

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This combined vitamin-and-mineral tonic will be found especially effective in functional gastro-intestinal disturbances, in faulty nutrition, in B-complex deficiencies, and likewise during convalescence.

Sig.: One tablespoonful  
t.i.d.—a.c. Supplied in  
pint and gallon bottles

*Sharp & Dohme (Canada) Ltd.*  
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## SIGNIFICANT PYRIDIDIUM RESULTS

## SUMMARY

"From a series of 103 cases of common urogenital infections, a study has been made with a view of determining the analgesic effects of pyridium (phenylazo-alpha-alpha-diamino-pyridine monohydrochloride) by oral administration. The relief of distressing subjective symptoms in common urogenital infections, such as dysuria, pollakiuria, incontinence (dribbling), lower backache, pain in the costovertebral triangle, pain in the region of the ureter, suprapubic pain, and various referred pains has been evaluated."

"A series of 19 urologic surgical cases was studied for the effects of pyridium on preoperative and postoperative subjective symptoms."

"A series of 130 cases was studied to determine the local analgesic effects of pyridium during diagnostic instrumentation."

## CONCLUSIONS

"A series of cases in which pyridium was used for the control of dysuria, frequency and tenesmus showed a definite reduction in distressful symptoms."

"In a series of operative cases where pyridium was administered prior to and following operation, wound anesthesia and a general analgesia were produced to a degree where the need for narcotics was minimal."

"Most of the cases reported required no postoperative narcotic medication whatever."

"In a series of cases in which pyridium was used for surface anesthesia in cystoscopy, for cystoscopic diagnostic procedures, and for urethral medication, adequate and satisfactory results were obtained."

"In all the series no other medication was employed except in 2 cases where narcotic therapy was also required."

★ Thus Morrissey and Spinelli\* summarize and conclude their results during their recent experiences with Pyridium in the treatment of various uropathies.

In addition to results to be expected from the peroral administration of Pyridium in tablet form and the local application

AN EXPERIMENTAL STUDY OF THE ANESTHETIC AND  
ANALGESIC PROPERTIES OF PYRIDIUM

JOHN M. MORRISSEY AND ANTHONY N. SPINELLI

[illegible]

To a clinical investigation of this effect of phenylalanine- $\alpha$ -keto-glutarate decarboxylase inhibitor, commercially available under the trade mark name "Pyridium," the drug was tried experimentally in a series of 101 cases, in all of which dysuria was a predominant symptom on admission to the hospital. Eighty of these cases are reported here.

The balance comprised a group of cases of gonorrheal proctitis where the dysuria was not of marked degree. In the few orthotrichs where the dysuria was too brief to permit satisfactory remaining cases, hospitalization was too brief to permit satisfactory analysis of all symptoms comprising dysuria, polyuria, nocturia, etc. In the postoperative triangle, pain

In the cases of prostatic hypertrophy it was observed that urinary frequency by day and night was markedly diminished in those cases showing a residual not above 5 ounces. The associated cystitis commonly

<sup>2</sup> Phenyl-ethyl- $\alpha$ -chloro- $\alpha$ -methyl- $\beta$ -methyl- $\gamma$ -hydroxide.

\* This study was made possible by a grant from the National Science Foundation.

**THE JOURNAL OF UROLOGY**  
Official Organ of the American Urological Association  
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October, 1940

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of Pyridium solution, the effects are not dependent on control of the urinary pH or the diet, and freedom from irritation is assured.

PYRIDIUM is the United States Registered Trade-Mark of the product manufactured by Pyridium Corporation.

\*Morrissey, J. H., and Spinelli, A. N., *An experimental study of the anesthetic and analgesic properties of pyridium*, J. Urol. 44:381-385, Sept. 1940.

# PYRIDIDIUM

TRADE MARK  
(Phenylazo-Alpha-Alpha-Diamino-  
Pyridine Mono-Hydrochloride)

## A decade of service in urogenital infections

# CONSUMER FACTS

## ABOUT "5-MINUTE" CREAM OF WHEAT

**IRON.** *Amount:* Each average serving (20 grams dry) of "5-Minute" Cream of Wheat provides 8.5 mg.

*Source:* Ferric orthophosphate.

*Availability:* More than 80% as available as medicinal iron, and essentially equivalent to medicinal iron in effectiveness.

**CALCIUM-PHOSPHORUS.** *Amount:* Each serving (20 grams dry) of "5-Minute" Cream of Wheat provides 101 mg. of calcium and 118 mg. of phosphorus.

*Source:* Tricalcium phosphate.

*Utilization:* As good, if not better, than the corresponding elements contained in milk\*.

**VITAMIN B<sub>1</sub>.** *Amount:* Each ounce of "5-Minute" Cream of Wheat provides over 20 International Units\*\*.

This Vitamin has been added in the form of a stabilized wheat germ.

**FLAVOR.** Because of added wheat germ, "5-Minute" Cream of Wheat has wheatier flavor, cooks to slightly deeper color.

**QUICK COOKING.** Addition of disodium phosphate to Cream of Wheat slightly raises pH of cooking water,

causes starch cells to burst much more quickly during cooking.

**DIGESTIBILITY.** After only 5-minutes of boiling, "New" Cream of Wheat is just as digestible as "Regular" Cream of Wheat after long cooking in double boiler.

*Evidence:* Microscopic examination of stools of infants limited to this cereal as their only source of starch proves complete digestion.

**BLANDNESS.** Crude Fibre: "5-Minute" Cream of Wheat contains only 1 part in 200, because all bran particles are completely screened out of added wheat germ.

**ECONOMY.** "5-Minute" Cream of Wheat costs no more than "Regular" Cream of Wheat. 28-ounce package contains 40 servings.

\* The Retention of Calcium and Phosphorus by Pre-school Children. *Journal Nutrition* 19: 401-414 (Apr.), 1940.

\*\* Contains 70. International Units per 100 grams.



"CREAM OF WHEAT" REGISTERED TRADEMARKS REG. U.S. PAT. OFF.

**MADE IN CANADA** WITH CANADIAN WHEAT BY THE CREAM OF WHEAT CORPORATION, WINNIPEG

*New*

# METANDREN "Ciba"

(Methyltestosterone)

## The Male Hormone in Tablet Form for Oral Use.

Testosterone propionate (Perandren) although highly efficient when administered intramuscularly, is of little value when given by mouth. On the other hand, the work by Miescher and Tschopp, and Emmens and Parkes has shown that methyltestosterone was quite active when given orally. Foss (*British Medical Journal*, 1939) was the first to report clinical observations on the effect of methyltestosterone given by mouth. He found that this form of testosterone "has not only a sexual, but a general metabolic effect similar in all respects to that produced by injections of moderate doses of testosterone propionate."

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The ratio of effectiveness of oral testosterone to intramuscular testosterone is approximately 4:1, i.e., 10 mgrms., of Metandren daily, in two doses, is about equal in effect to one 10 mgrm. dose of testosterone propionate injected intramuscularly twice a week.

METANDREN "Ciba" is available in scored 10 mgrm. tablets  
in boxes of 15, 30 and 100.

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# Now Babies Need Suffer Fewer Digestive Upsets

Thanks to

**Libby's**  
**HOMOGENIZED**  
(EXTRACELLULAR)  
**BABY FOODS**

Danger of severe digestive upsets caused by fermentation of undigested food in the intestinal tract has prevented most doctors from adding nutritious solid foods to the diet of the very young infant.

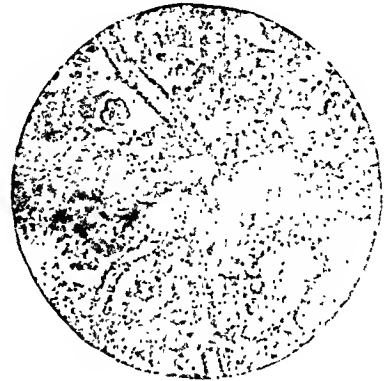
Even when carefully strained, vegetables and fruits contain too many coarse fibres and indigestible particles for the digestive juices of the young baby to break up and assimilate. Yet vegetables and fruits contain nutritious elements and minerals necessary to a well-balanced diet.

A process far superior to straining, called Homogenization, has been perfected by Libby's. This process breaks up all coarse fibres and food cell walls, makes the food so fine and smooth that it is easily and quickly digested, placing little or no strain on the infant digestive system. In-vitro digestion tests showed that Libby's Homogenized Vegetables digested more completely in 30 minutes than strained vegetables in two hours. Bulk necessary for normal elimination is retained, but refined so that it should not irritate the delicate intestinal tract of the infant.

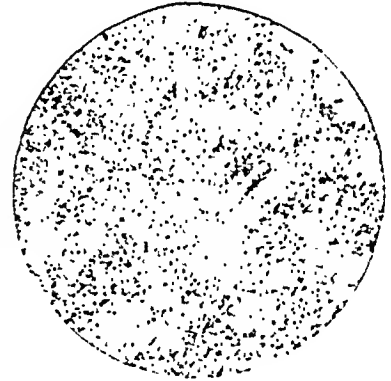
Also Homogenization breaks up the food cell walls, releasing the nutrient enclosed inside for easier assimilation—so Libby's Homogenized Baby Foods yield more nutrient than an equal amount of food strained commercially or at home.

Babies as young as six weeks have been fed Libby's Homogenized Baby Foods with no digestive upsets and doctors will immediately recognize the value of these foods in early solid food feeding.

○ Photomicrograph of vegetables after careful straining. Note coarse texture.



● Photomicrograph of vegetables after Homogenization by Libby's exclusive process. Note how food cells are broken up, texture refined.



## FREE SAMPLES

and descriptive literature will be mailed on request to physicians and pediatricians. Please address your requests to Libby, McNeill & Libby Laboratories, Chatham, Ontario.

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These combinations of Homogenized Vegetables, cereal, soup and fruits make it easy for the Doctor to prescribe a variety of solid foods for infants

1 Peas, beans, asparagus.

2 Pumpkin, tomatoes, green beans.

3 Peas, carrots, spinach.

4 Whole milk, whole wheat, soy bean flour.

5 Prunes, pineapple juice, lemon juice.

6 Soup—carrots, celery, tomatoes, chicken liver, barley, onion.

7 A meatless soup—consisting of celery, potatoes, peas, carrots, tomatoes, soy flour, and barley. Can be fed to very young babies.

8 An improved fruit combination—Bananas, apples, peaches are combined to give a nutritious fruit combination that is very tasty.

9 An "All Green" vegetable combination—Many doctors have advised this food to both hard green beans are blended to give a very desirable vegetable product.

10 Tomatoes, carrots and celery. These give a new vegetable combination of exceptionally good digestible properties and flavor.

And In Addition, Three Single Vegetable Products Specially Homogenized

**CARROTS — PEAS — SPINACH and**  
**LIBBY'S HOMOGENIZED EVAPORATED MILK**

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Where tablet form is preferred No. 338 and No. 338-A provide ferrous chloride in permanently stable form in pleasantly coloured and coated tablets.

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#### REFERENCES

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- "The Therapeutic Action of Iron," by L. J. Witts, M.D., Manch., F.R.C.P., Lond. Professor of Medicine in the University of London at St. Bartholomew's Hospital Medical School. The Lancet 1935—1, 1, for further information on the action of Ferrous Iron.

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If a sore throat resists topical treatment for 48 hours or more, or if there are symptoms of high fever, malaise, ulceration of the mucous membranes, chills, headache or vomiting, the possibility of agranulocytosis cannot be excluded without an immediate blood examination.

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*"At present it would appear that Pentnucleotide in doses of at least 40 cc. a day is the most promising form of specific therapy in this disease."*

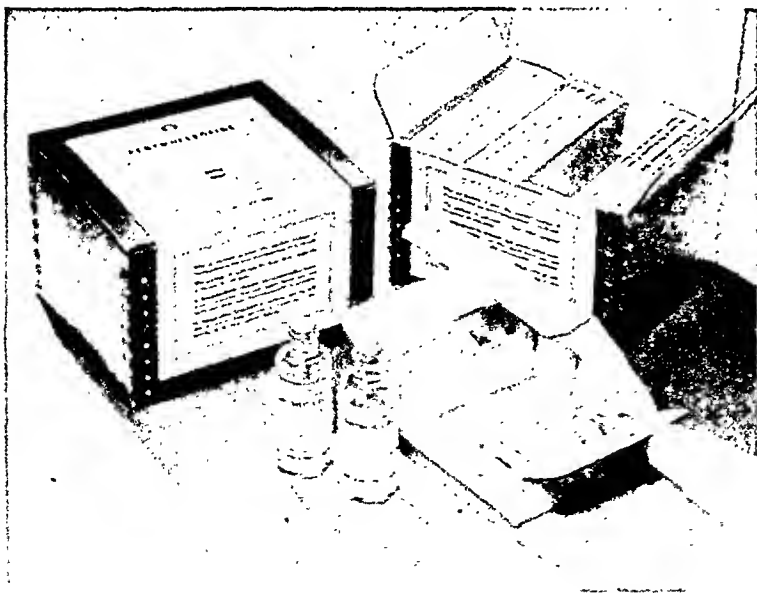
(Jackson, H., Jr. and Tighe, T. J. G.—*New Eng. J. Med.*, 220:729, 1939.)

*\*In divided doses—10 cc. 4 times daily.*



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*S. H. Camp & Company  
announces 3rd Annual*



In announcing 1941 National Posture Week we do so with a genuine expression of appreciation to the medical profession, public health groups, schools, and colleges throughout the country whose support of this activity has helped to make it an educational event of importance. We are happy in the knowledge that with each succeeding year, National Posture Week has resulted in more women being made conscious of the relationship of posture to health, as well as the importance of seeking professional advice regarding the ills caused by poor posture.

This year, as in the past, National Posture Week will be given widespread publicity through magazines, newspapers, and radio. In addition, non-commercial literature will be distributed to schools and colleges as an extension of our Public Health Educational Activities.

Many of our dealers throughout the country will also cooperate to help awaken the consciousness of the masses to the importance of correct posture. As always, we will endeavor to adhere to the ethical practices which will merit your approval.

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All gelatine.
Protein 85% to 87%.
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Absolutely no sugar.
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Only contain 10% to 12% gelatine.
Protein 10% to 12%.
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Contain flavoring, acid and coloring matter.
Contraindicated in diabetic, peptic ulcer and other diets.

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## *and varied with* KNOX GELATINE (U.S.P.)

We have compiled a booklet which may save you time and trouble in preparing diets for your diabetic patients. It is called "Feeding Diabetic Patients—Young and Old"

The booklet contains a discussion of the principles of diabetic feeding, practical tables of food composition expressed in percentages of 100-gram portions, sample menus, and 33 pages of simple, economical and attractive recipes with composition and caloric value of all foods and recipes.

The use of Knox Plain (Sparkling) Gelatine is explained, with examples of how Knox Gelatine can give variety to appetizing "full-sized" meals without interfering appreciably with caloric requirements. (Knox is 85% to 87% protein—entirely free of sugar.) It contains a majority of the food amino acids and has been shown to supplement protein of nearly every variety of food.

Also included in this booklet are typical dietary prescriptions representing Normal Carbohydrate Maintenance, Restricted Carbohydrate High Fat, Diabetic Reducing and Children's Diabetic diets.

The coupon below will bring you as many of these diet booklets as you require, without obligation.



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A SUPPLEMENTARY  
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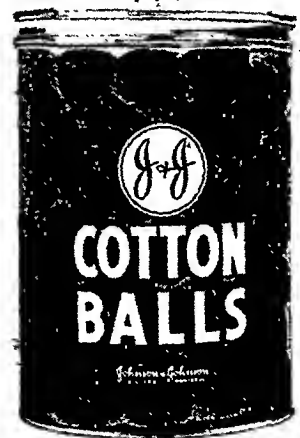
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**FREE!**

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## Another Contribution from the Biochemist to Modern Medical Science

The literature of the past decade offers convincing evidence of the intensive research which has been directed toward the discovery of a product which would faithfully reproduce in humans the gonad-stimulating effects of the anterior pituitary gland.

Since the discovery of the hormone of pregnant mares serum in 1930, its physiologic properties have been exhaustively investigated. These studies, both in animals and in humans, indicate that this hormone does possess gonadotropic effects which closely simulate those of the anterior pituitary gland.

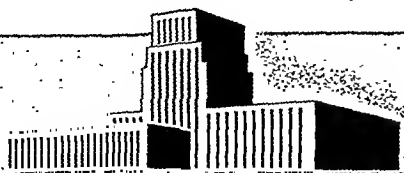
Gonadogen is a highly purified preparation of this hormone. Prepared by the method developed by Cartland and Nelson in the Upjohn Research

Laboratories, it is obtained in a high state of purity as a white, water-soluble powder which is stable in the dry form. Substantially free of serum proteins, it may be employed in human patients for subcutaneous, intramuscular or intravenous administration.

Gonadogen opens a new field of therapeutic possibility. Physicians are invited to send for comprehensive literature.

Gonadogen is available, through all pharmacies, in two strengths—in boxes of six rubber-capped vials, each vial containing one sterile tablet of 10 Cartland-Nelson units (approximately 200 International units), together with six 1 cc. ampoules physiologic salt solution; and in boxes of three rubber-capped vials, each vial containing one sterile tablet of 20 Cartland-Nelson units (approximately 400 International units), together with three 1 cc. ampoules physiologic salt solution.

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**Painful Muscles**

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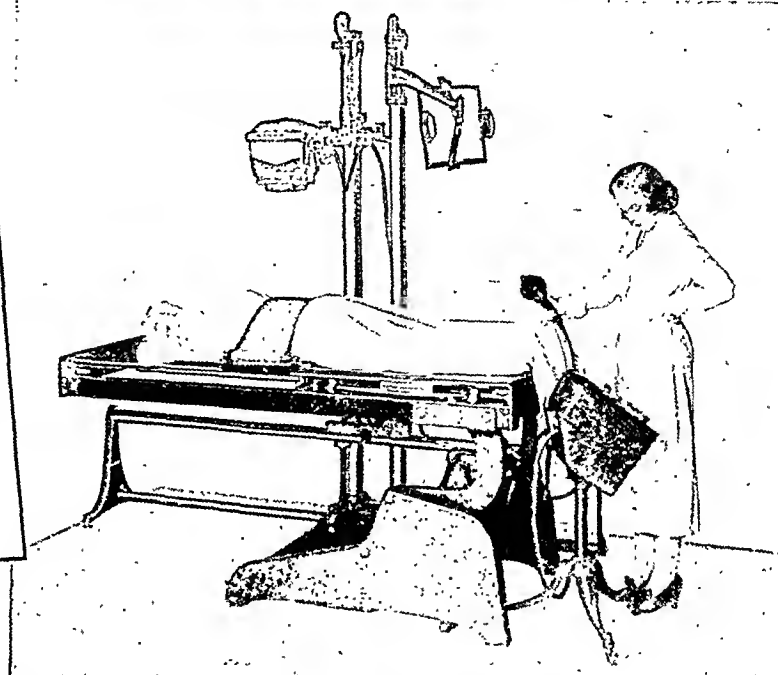
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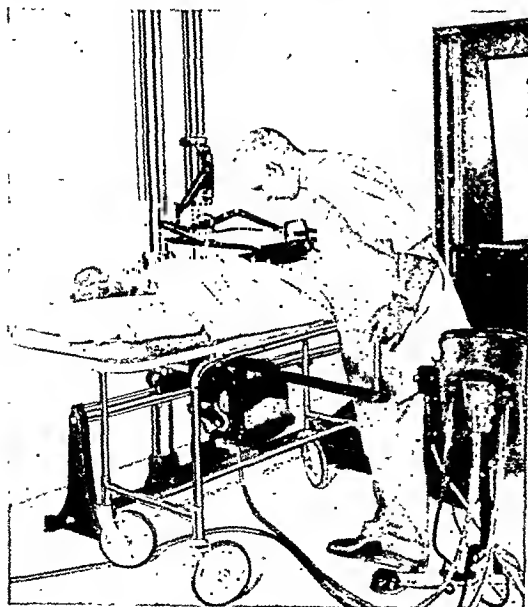
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**CARROTS.** Sweet, mature carrots are chopped coarse enough to require chewing. The rich orange colour indicates its high content of vitamin A.

**MIXED VEGETABLES.** This is a nutritious blend of several vegetables, highly favoured for the diet of children. It contains potatoes, sweet potatoes, carrots, celery, green beans and onions.

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**PINEAPPLE RICE PUDDING** is prepared from juicy Hawaiian pineapple in a wholesome custard with rice. Its high carbohydrate content makes it an energy-giving food—the eggs and milk increase its nutritive value.

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**APPLE FIG AND DATE DESSERT.** Ripe, full-flavoured apples are blended with the small-seeded variety of white figs and select dates. Lemon juice is added to enhance this combination of rich, zesty flavours with a touch of tartness.

April 1941]

# CANNED FOODS AS SOURCES OF THE ESSENTIAL NUTRIENTS

● Early in this century, the existence of "accessory food factors"—the vitamins—was demonstrated by animal experiments (1, 2). Since that time, building upon information regarding the calorific, protein, and mineral needs of man, contemporary workers have developed a practical and fairly complete working knowledge of nutrition. At the present time, the fundamental human dietary requirements are considered in terms of some thirty substances of known chemical composition plus a number of factors whose chemical natures still await determination (3). Likewise, the dietary values of foods also may be discussed in terms of these same essential nutrients.

Viewed from a physiological basis, nutritional failures appear to be conditioned either by consumption of a diet deficient with respect to certain of the essential food factors or to altered processes in metabolism which prevent the efficient absorption and utilization of foods (1). Failures of the latter type can be corrected only by elimination of the defects in metabolism, or by administration of nutrients by routes which permit utilization. However, the vast majority of nutritional failures are associated with the consumption of diets deficient with respect to essential food factors. In the following quotation, the facts regarding malnutrition resulting from faulty diet are concisely stated (1):

"Three facts concerning nutritive failure are becoming increasingly obvious; first, that it

does not come solely from lack of vitamins but from deficiency of proteins and minerals as well; in certain of the lower animals, it comes even from lack of fats; second, that in America it is seldom complete; and third, that it is not, as a rule, the expression of a single nutritive fault. More often it is partial in extent and multiple in nature, with a clinical picture that is correspondingly lacking in detail and hazy in outline."

Although nutritional diseases are manifestations of the prolonged consumption of diets deficient with respect to amino acids, minerals, and vitamins, students of the problem agree (2, 4, 5, 6) that elimination of malnutrition is primarily a problem of increasing the variety of foods regularly eaten. Special emphasis should be placed upon the judicious consumption of familiar foods such as meats, (including glandular organs, poultry, sea food, and fish); eggs; milk in its many forms; milk products; fruits and vegetables; legumes; and the whole cereals and their various products. Thus, in its practical application (7), nutrition may be viewed as "an economic, agricultural, industrial and commercial problem, as well as a problem in physiology."

The nutritive values of canned foods have indeed been well established by means of numerous studies (8). By transforming foods, from the perishable condition in which they are harvested, to canned foods which may be stored for consumption in all seasons, the canning industry has rendered great assistance in carrying out the programme designed to eliminate malnutrition.

**AMERICAN CAN COMPANY**  
MONTREAL • HAMILTON • TORONTO  
AMERICAN CAN COMPANY, LTD. • VANCOUVER

1. 1939. J. Am. Med. Assoc. 112, 2110.
2. 1938. J. Am. Med. Assoc. 111, 1073.
3. 1940. J. Med. Assoc. Alabama 9, 365.
4. 1940. J. Am. Med. Assoc. 114, 548.
5. 1939. U. S. Dept. Agr. Circular No. 507.

6. 1938. J. Am. Med. Assoc. 111, 1846.
7. 1935. Quart. Bull. Health Organ, League of Nations 4, 326.
8. 1939. Canned Food Reference Manual, American Can Company, New York.



# LACTOGEN

*Easy for  
Infants to Digest*

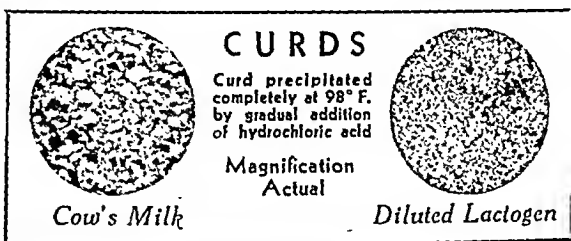
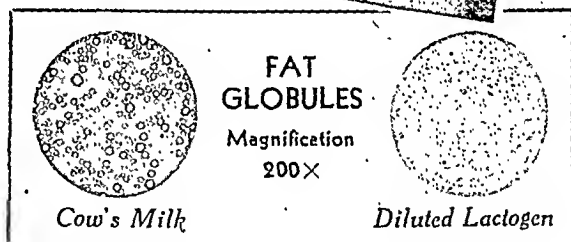


Two special processes are used to make the modified cow's milk used for Lactogen more closely approximate woman's milk in digestibility.

By *homogenization* the large fat particles of cow's milk are broken down into much smaller size, thus exposing a larger area to the action of the digestive enzymes.

Spray desiccation in spotless chambers of stainless steel results in beneficial changes in the physical characteristics of the casein, producing a finer, more flocculent curd as shown by the photo-micrograph.

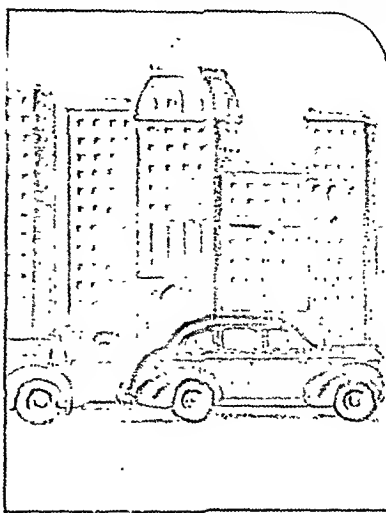
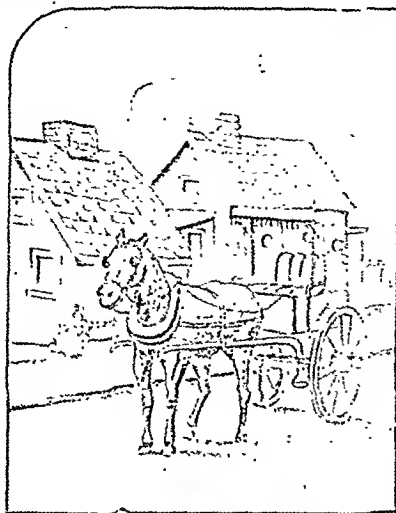
Lactogen is especially convenient and safe. It may be used even where there is no refrigeration. Its preparation is simple, even for the most inexperienced mother.



● No advertising or feeding directions, except to physicians. For free samples and literature, send your professional blank to "Lactogen Dept.," Nestlé's Milk Products (Canada) Limited, Toronto, Canada.

**NESTLÉ'S MILK PRODUCTS (CANADA) LTD.**  
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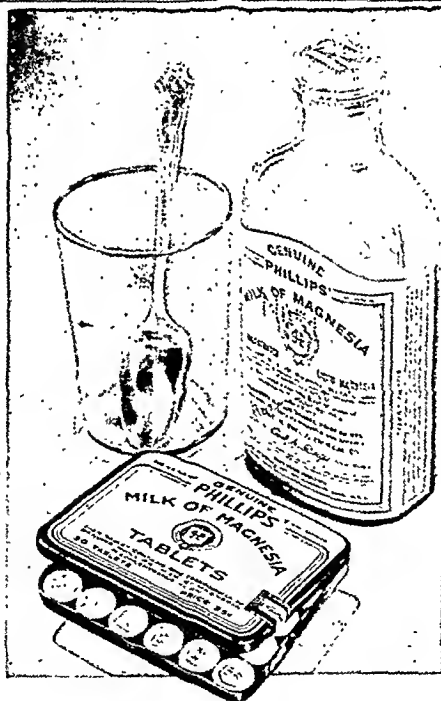
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Hyperacidity—constipation—  
know no class distinctions.

As a reliable source of antacid therapy and gentle laxation, Phillips' Milk of Magnesia has served the medical profession for over 60 years.

It exerts a prolonged antacid effect, since it is only sparingly soluble. As a laxative it is gentle and non-irritating.



Palatable, too, and in convenient dosage forms:

**PHILLIPS' MILK OF  
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**PHILLIPS' MILK OF  
MAGNESIA TABLETS**

Each tablet equivalent to a teaspoonful of the liquid.

Dosage:

As an antacid: 2 to 4 teaspoonfuls (2 to 4 tablets)

As a gentle laxative: 4 to 8 teaspoonfuls.

We will send you a professional package upon request.

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*For Hypertensive Heart Disease Prescribe*

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*Each pulvet represents:*

Theobromine. . . . . 5 grains  
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Oil of Juniper. . . . 1/2 grain  
Hypnolone . . . . . 3/5 grain  
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An effective Diuretic, particularly useful when there is an accumulation of fluid in the body due to Cardiac failure. Although Theobromine and Strophanthin may produce a slight general rise in blood pressure, the rise is much less than that produced by Caffeine and other Cardiac Diuretics, and the Renal Vessels are not constricted but on the contrary actually permit more blood to pass through the kidneys and the use of Thebarlone Hartz is therefore not contra-indicated in Hypertension.

Thebarlone Hartz is recommended in Cardiac Dropsy, and Angina Pectoris. Effectively relieves the nervous excitement and insomnia often associated with Angina Pectoris and Arterio-Sclerosis.

*Caution:* Contra-indicated in Acute Nephritis.

*Dose:* One to two pulvets every four to six hours as may be indicated.

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VI-TONE tends to break down the tough curd in milk, improving both digestibility and nutritional balance. The delicious chocolate flavour helps to overcome milk-intolerance. Here is a food-drink, rich in iron, easily prepared hot or cold.

# VI-TONE

Companion to Milk



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Is there any antiseptic which can be used as safely in the home as in a hospital ward? Can you recommend an antiseptic which can be used as fearlessly for personal uses as for application to a scratch or insect bite?

Yes — you can unhesitatingly recommend 'DETTOL' for all home uses. This powerful, new British antiseptic destroys germs quickly, yet is non-poisonous and gentle to human tissue. You know its record of efficiency in the surgical and maternity wards of Canadian and British hospitals—prescribe it confidently for first aid, douching and general antiseptics.

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- Non-Staining
- Phenol Coefficient 3.0
- Does Not Hurt
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- An Excellent Deodorant



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# 'DETTOL'

(TRADE MARK)

## THE MODERN ANTISEPTIC

# FERROSULPH

FERROUS SULPHATE EXSICCATED

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**FOUR OUTSTANDING TABLETS**

**FERROPHOS—B (Improved)**

S.C.T. WHITE (No. 5171)

*Formula:*

Ferrous Sulphate.....	3 grs.
Thiamin Chloride .....	100 I.U.
Yeast Concentrate .....	2 grs.
Ext. Nux Vomica .....	1/4 gr.
Phosphorus.....	1/100 gr.

*Dose:* One tablet four times a day after meals and at bedtime.

**FERROSULPH COMPOUND**

S.C.T. PURPLE (No. 446)

*Formula:*

Ferrous Sulphate Exsiccated.....	3 gr.
Copper Sulphate .....	1/100 gr.
Manganese Sulphate.....	1/100 gr.
Strychnine Sulphate.....	1/100 gr.

Copper and Manganese act as catalysts in the manufacture of haemoglobin iron and in addition Manganese is believed by some to render haemoglobin more vulnerable to destruction.

*Dose:* One tablet four times a day after meals and at bedtime.

**FERROSULPH COMPOUND**

(DAVIDSON'S C.T. No. 44)

*Formula:*

Ferrous Sulphate Exsiccated.....	3 gr.
Copper Sulphate .....	1/100 gr.
Manganese Sulphate.....	1/100 gr.

This is the original Davidson formula in an uncoated tablet.

*Dose:* One tablet four times a day, after meals, and at bedtime.

**FERROSULPH NERVINE**

S.C.T. RED (No. 5149)

*Formula:*

Each tablet contains:

Ferrous Sulphate Exsiccated.....	3 gr.
Vitamin B equiv. Med. Yeast.....	2 gr.
Phenobarbital Sodium .....	1/4 gr.
Ext. Nux Vomica.....	1/4 gr.
Phosphorus.....	1/100 gr.

Ferrous Sulphate supplemented by the sedative action of Phenobarbital and the tonic properties of Nux Vomica and Phosphorus. The well known catalytic action of Vitamin B<sub>1</sub> and B<sub>2</sub>, with iron, is found in the Yeast which is added to the formula. An ideal nerve tonic, haemoglobin and sedative.

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*Rx The Medicated  
vapors of  
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Vapo-Cresolene employs a specially prepared cresylic acid of high purity and low boiling point. Thus, it quickly provides a penetrating, medicated vapor beneficial to the inflamed respiratory membrane. Its sedative and antiphlogistic action helps to check cough paroxysms and promote breathing comfort. Being an Inhalant, Vapo-Cresolene does not disturb digestion, a fact which makes it particularly desirable for use with young children. For over sixty years Vapo-Cresolene has manifested usefulness in the relief of the paroxysms of Whooping Cough and Bronchitis, Cough due to Colds and Spasmodic Croup. Send for professional literature, Dept. 3.

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Recall that soap advertisement you read years ago — "Have you a little Fairy in your home?"

Well, if *your* "little fairy" has now grown to this plenty-spending age, nobody has to remind **YOU** how necessary it is to bring in every dollar possible from your past-due accounts, Doctor!

*So start the good work now!*

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COOLER**



Drink  
**Coca-Cola**  
Delicious and Refreshing

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FAMOUS FOR PURITY  
AND WHOLESOMENESS

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effective treatment suggests the use of agents to correct mineral deficiency, increase cellular activity, and secure adequate elimination of toxic waste.

## LYXANTHINE - ASTIER

orally given, supplies calcium, sulphur, iodine, and lysidin bitartrate—an effective solvent. Amelioration of symptoms and general functional improvement may be expected.

Since the best evidence is clinical evidence, write for literature and sample.

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*Every Spencer Support is individually designed to improve the posture of the patient as well as to meet the needs of the specific condition for which it is prescribed.*

**MOVABLE KIDNEY** In addition to abdominal support, designed to reach from pubic bone to umbilicus, a Spencer Support for Movable Kidney improves the general health of the patient by means of posture correction.

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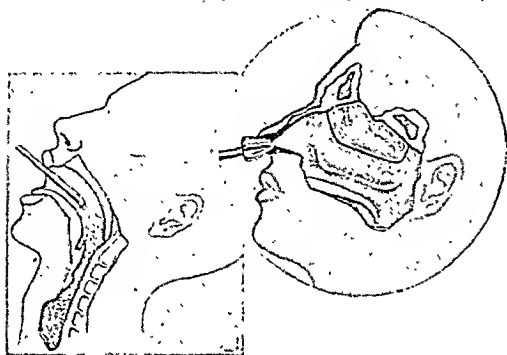
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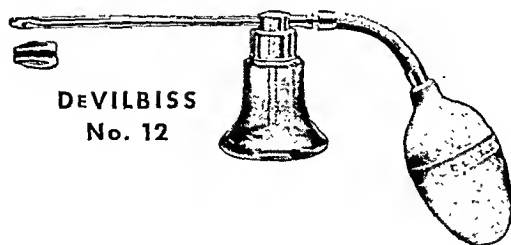
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X-ray research indicates that spraying reaches areas inaccessible by dropping and gargling. And once your patients know the benefits of spraying, you'll find they get greater satisfaction from your prescribed home treatments.

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No. 12

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**Indications:** Amenorrhea, dysmenorrhea, menorrhagia, metrorrhagia, menopause, in obstetrics.

**Dosage:** One or two capsules three or four times daily.

**How Supplied:** In ethical packages of 20 capsules.

Write for booklet: "Menstrual Regulation  
by Symptomatic Treatment"

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They can be readily digested and do not irritate in the slightest degree the delicate intestinal tract of the infant.

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A convenient pocket calculator, with varied infant feeding formulae employing these two famous corn syrups . . . a scientific treatise in book form for infant feeding . . . and prescription pads, are available on request, also an interesting booklet on prenatal care. Kindly clip the coupon and this useful material will be mailed to you immediately.

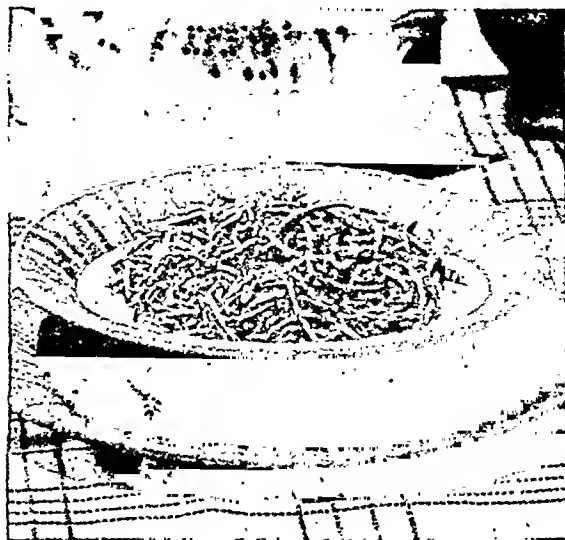
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☐ Book "CORN SYRUPS FOR INFANT FEEDING."  
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☐ Book "THE EXPECTANT MOTHER."  
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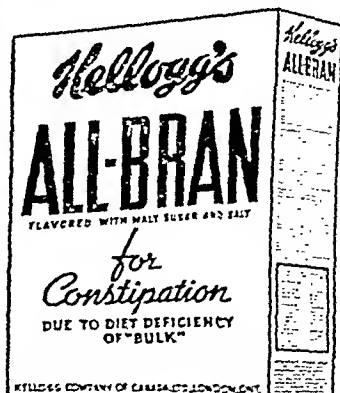
## Facts about a "BULK"-FORMING FOOD

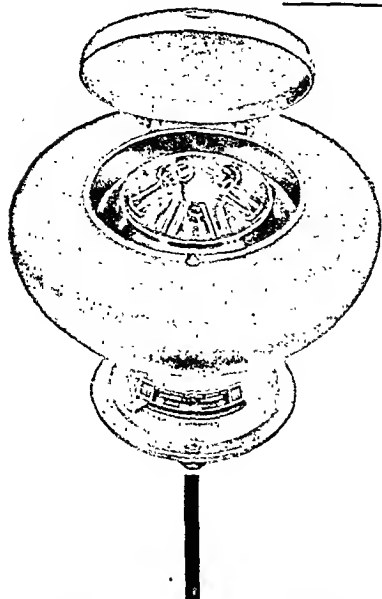
In treating constipation, it is generally recognized there is a need for a food which, when used regularly, provides "bulk"-forming properties. KELLOGG'S ALL-BRAN . . . a crisp, ready-to-eat cereal . . . is such a food. (ALL-BRAN is also delicious in hot buttered muffins.) It is particularly adaptable to the treatment of constipation for two reasons:

1. ALL-BRAN is "bulk"-forming . . . not "bulk".
2. ALL-BRAN acts on the contents of the colon . . . not the colon itself.

Both of these characteristics have been proved by experiments.

**FREE:**—Reprints of two authoritative articles relative to bran and constipation, from the American Journal of Digestive Diseases and the Journal of the American Medical Association. Write Box A, Kellogg Company of Canada, Limited, London, Ontario.





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 ANGLE  
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## INTERNATIONAL Clinical Model Centrifuge

*the small centrifuge with:*

- BOTH ANGLE and HORIZONTAL SEDIMENTATION.
- LARGE CAPACITY—200 ML.
- COMPLETE PROTECTION.
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2,800 r.p.m. on A.C.  
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*Send for Bulletin CC-1940*

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*Makers of Fine Centrifuges*

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Constant muscular activity year in and year out with the added stimulus of nervous excitation, worry and strain is apt to produce a tired heart.



## CACTINA PILLETS

a preparation of Cactus Grandiflora, is indicated in cardiac conditions due to over-stimulation, excesses or fatigue. Dose: 1 - 3 pillets t.i.d.

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*a million deposit accounts  
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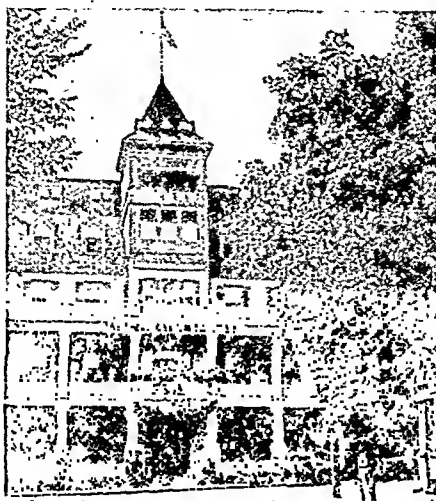
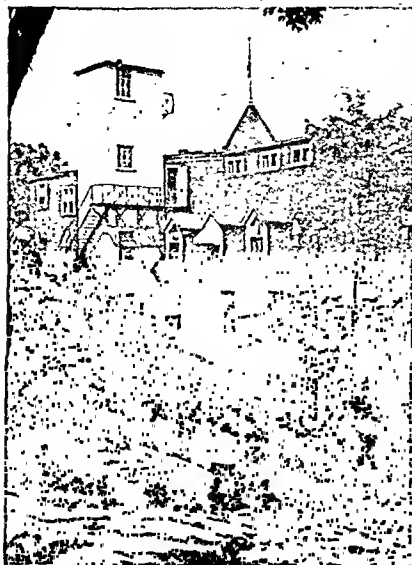
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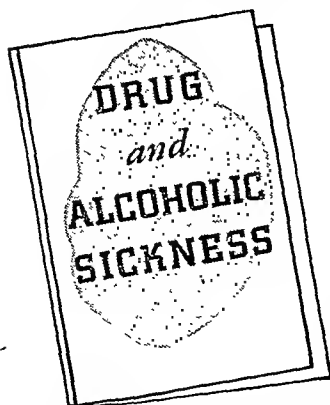
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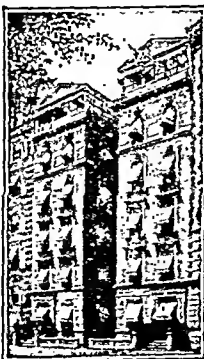
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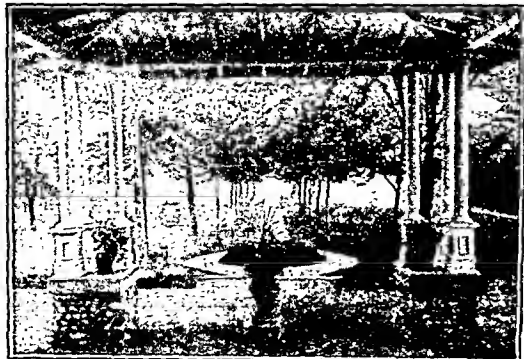
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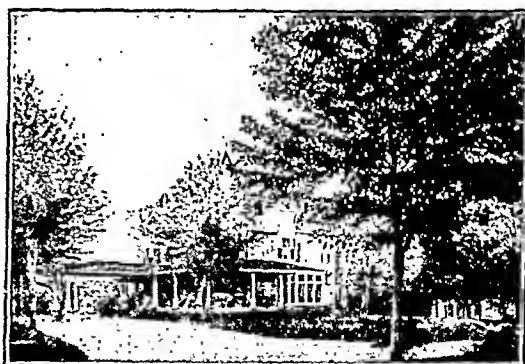
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# COOK COUNTY GRADUATE SCHOOL OF MEDICINE

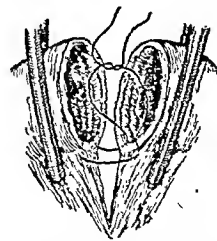
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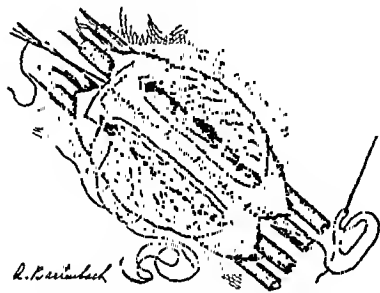
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### COURSES

Allergy.....	May 12-16	Ophthalmology & Otolaryn-	
Anatomy (Wednesdays).....	Feb. 12-May 28	gology.....	Apr. 17-23
Diseases of the Blood.....	May 19-23	Pathology:	
Diseases of Genito-Urinary		(a) Neoplasms.....	June 30-July 11
Tract.....	Apr. 17, 18 & 19	(b) Female Genito-Urinary	
Diseases of the Heart.....	May 21, 22 & 23	Organs.....	July 14-25
Electrocardiographic Diagnosis.....	Nov. 3-8	(c) Eye.....	July 28-Aug. 8
Gastroenterology.....	April 28-May 1	(d) Ear, Nose & Throat.....	Aug. 11-22
Internal Medicine.....	June 30-Aug. 22	Pediatrics.....	Apr. 28, 29 & 30
Laboratory Technique.....	June 30-Aug. 8	Proctology.....	Apr. 14, 15 & 16
Nutritional and Endocrine		Röntgenology.....	Apr. 14-19
Problems.....	Nov. 3-6		

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It is impossible to arrange and publish the usual list of courses for the whole year. Courses are arranged as it is found practicable to do so, and special attention is paid to the requirements of candidates for the M.R.C.P. (London) and F.R.C.S. (England) examinations.

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Winnipeg, London, Toronto, Kingston, Montreal, Quebec, and  
Monday, September 29th; Tuesday, September 30th; Wednesday,

Oral Examinations in the Primary subjects, and Oral and Clinical  
Final subjects will be held at Montreal and Toronto on the following dates:

**MONTREAL**—Tuesday, October 21st—Wednesday, October 22nd

**TORONTO**—Thursday, October 23rd—Friday, October 24th.

A SPECIAL EXAMINATION in the Primary subjects for English-speaking candidates will be held on the following dates:—Written Examinations—Friday, May 30th.

Oral Examinations at Toronto only—Tuesday, June 17th—Wednesday, June 18th.

Candidates who are graduates of 1930 or prior thereto of a Medical School or University approved by Council shall not be required to take the Primary Examination; but shall in the Final Examination demonstrate a general and practical knowledge of the clinical application of Anatomy and Physiology.

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